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Common and Preventable Parasitic Ailments of the Domestic Fowl.

A Contribution to the Study of the Hygiene of Poultry.

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A.—Introduction.

The hygienic control of parasitic diseases is closely associated with a knowledge of the morphology, habitat and the salient features of the life-cycle of the parasites, so that therapeutic attacks can be directed against the most vulnerable stage of the infestation. Moreover, for the prevention of re-infection, one must consider the hatching out of resistant or cryptic stages, so that by their destruction an absolute cure may be achieved.

These considerations are particularly applicable to the treatment, control and prevention of parasitism in poultry, in which these conditions, if neglected, may cause a chronic and continuous loss in productivity of the fowls, or, in an acute form, like recent outbreaks of fowl-plague, practically wipe out the fowl population of large counties.

The relatively small size of the hen, added to intense productive stress, makes this host particularly susceptible to the ravages of parasitism. For this reason also, recent advances in the knowledge of avian diseases deserve the serious diagnostic attention of veterinarians throughout the country; for it will be seen that pathological problems of poultry diseases, though similar, are not quite identical with those encountered in relation to other larger farm animals, but are certainly equally important.

B.—External parasites = Ecto-parasites.

1.—Fowl-Lice = *Mallophaga.*

Bird-lice feed on fluff, the barbs of feathers, loose skin-scales and sometimes on dried blood, all of which they triturate or pulverise with their mandibles; they differ, therefore, from human and mammalian sucking-lice which are Anoplura (Siphunculata) and pierce the skin and aspire blood by means of tube-like mouth-parts.

Hens and fowls in general are known to harbour between 40 to 50 described varieties of mallophaga; some of these are strictly specific, in so far that they will only thrive and multiply on certain birds, such as the turkey or pheasant or swan; others will infest indifferently the pigeon and chicken, the peacock and guinea-fowl, etc.

The domestic hen is subject to the depredations of specific mallophaga which are rarely found on other birds and also of such as will spread indifferently to feathered animals in the neighbourhood. Though some chicken-lice range

all over the body, other varieties are seldom found elsewhere than on the head and neck, or again in the fluff under the wings and around the vent. These numerous variations show that the accurate identification of mallophaga can influence and guide prophylactic measures for their eradication.

Development of Avian Mallophaga.

All avian mallophaga can complete their life-cycle on one bird, though they will show a pronounced predilection for certain fowls in any run. The eggs or nits are usually laid singly or in radial groupings, firmly stuck on to the shaft or web of the feathers by a glutinous substance; these nits, given suitable temperature conditions, can hatch out in five days, and a minute colourless louse will appear, somewhat similar to the adult, but smaller and semi-transparent; after several moults (three to five, according to species), as the result of a gradual increase of size, the male and female adult stage will be reached in two to three weeks.

Hens will be found frequently infested with any two or three easily recognizable species of mallophaga; the accurate identification of numerous other somewhat rarer species, is a matter of experience.

Head-Louse, *Lipeurus heterographus*, Nitsch.

This is scarcely found elsewhere than on the head or neck, except when the hen, through weakness or disease, has allowed the lice to multiply excessively. This Lipeurus lives close to the skin, is greyish in colour and about a tenth of an inch in size. The minute oval eggs or nits are seen to be adhering singly to the feathers.

This ectoparasite is particularly dangerous to chicks, making them restless and fidgetty so that they do not thrive; adult hens also suffer, because they find it difficult to reach the lice and their egg-yield is affected.

Shaft-Louse, *Menopon gallinae* (Linnæus) *M. pallidum*, Nitsch.

This is the commonest and most active of all avian Mallophaga and is the one that one carries away when handling or examining verminous poultry. It is smaller than the avian body-louse and its mode of life differs somewhat, since it is usually found on the shaft of feathers and only runs to the body when it is discovered. Though closely associated with *Gallus domesticus*, it has also been described on turkeys and ducks living in close proximity with chickens. The nits are detected in small radiated clusters on the feathers, which sometimes will become matted together.

Avian Body Louse, *Menacanthus stramineus*, Nitsch = *Menopon biseriatum*, Piaget.

Usually found where the body is not heavily feathered, as on the breast or along the thighs or in the abdominal region near the vent. This is somewhat larger than the shaft louse, not as active and a pale-straw colour with dark spots, due to intestinal contents and also chitinous armatures.

Wing Louse, *Lipeurus variabilis*, Nitsch.

This is dark grey, with an elongate body, and though found occasionally wandering in other parts of the body, it is more frequently found on the underside of large wing feathers. It is relatively sluggish and easily caught. The eggs are long, white and glistening, firmly attached to the barbs of wing feathers.

Large Avian Louse, *Goniocotes gigas*, Taschenberg = *G. abdominalis*, Piaget.

The large chicken louse is easily recognisable by its size, about 3 by 4 mm., and dark grey colour; never very numerous, they are to be found on the surface of wing feathers; capable of rapid movement when detected. The egg nits are larger than those of *Lipeurus variabilis*.

Control and Eradication of Poultry Mallophaga.

It is quite feasible to reduce the numbers of lice and then completely rid the fowls of them on any farm, irrespective of the fact whether the poultry is allowed a free range, penned, or kept on an intensive principle, since all avian mallophaga will unwillingly leave a bird as long as it is alive. The result of destroying all mallophaga will soon show itself in increased egg production and improved appearance of fowls. It should not be forgotten that nits may drop off on feathers in the nesting boxes and hatch out there if the weather is warm and the hen sits frequently. Therefore, it is advisable to clear out the nest-boxes and burn the litter before treating the hens. The adult hens can then be powdered with commercial sodium fluoride, NaF. This is very effective and easily applied; its action lasts for several days, so that any lice which hatch within three or four days after the dusting are killed. Every single fowl should be dealt with on a cardboard tray and a small pinch of the NaF is placed among the feathers of various parts of the body, with particular attention to the fluff under the wings and near the vent.

It is important to treat sitting hens some time before the chicks are hatched, since, if this is neglected, the dusting of the hen might prove injurious to the chicks as they sleep at night under the hen. In such instances the less effective pyrethrum insect powder may be used.

Sodium fluoride is not without its drawbacks; it is irritating to the mucous membranes, so that the operator who has to deal with many fowls should place a gauze mask or linen handkerchief over his mouth and nose and wear spectacles. Likewise avoid introducing powder into the eyes and vent of birds treated.

In warm weather a dip method can be employed; one-and-a-half ounces of sodium fluoride are added to each two gallons of warm water, the heat of which can be maintained by the use of hot bricks under the tub. The fowls are held by the wings and plunged in a couple of times, the feathers being ruffled to allow the fluid to reach the skin; the head is then ducked and the fowl let go. The dip is easier to manipulate, more instantly effective, but care should be taken that the fowls are dry by sunset.

As a general preventive measure, the provision of a covered dust-bath can be recommended; the dust to consist of finely sifted ashes mixed with one in twenty by weight of flowers of sulphur.

2.—Fleas = *Aphaniptera*.

Fleas are not strictly attached to one host and will feed somewhat indiscriminately, though they do have their preferences in relation to their hosts.

Chicken Flea, *Ceratophylltus gallinae* (Schrank).

This flea is a voracious feeder at all times and one which will suck blood from man.

Chicken fleas are easily detected in the hay and sides of nesting boxes; there can be no doubt that they cause a great deal of restlessness in sitting chickens and induce

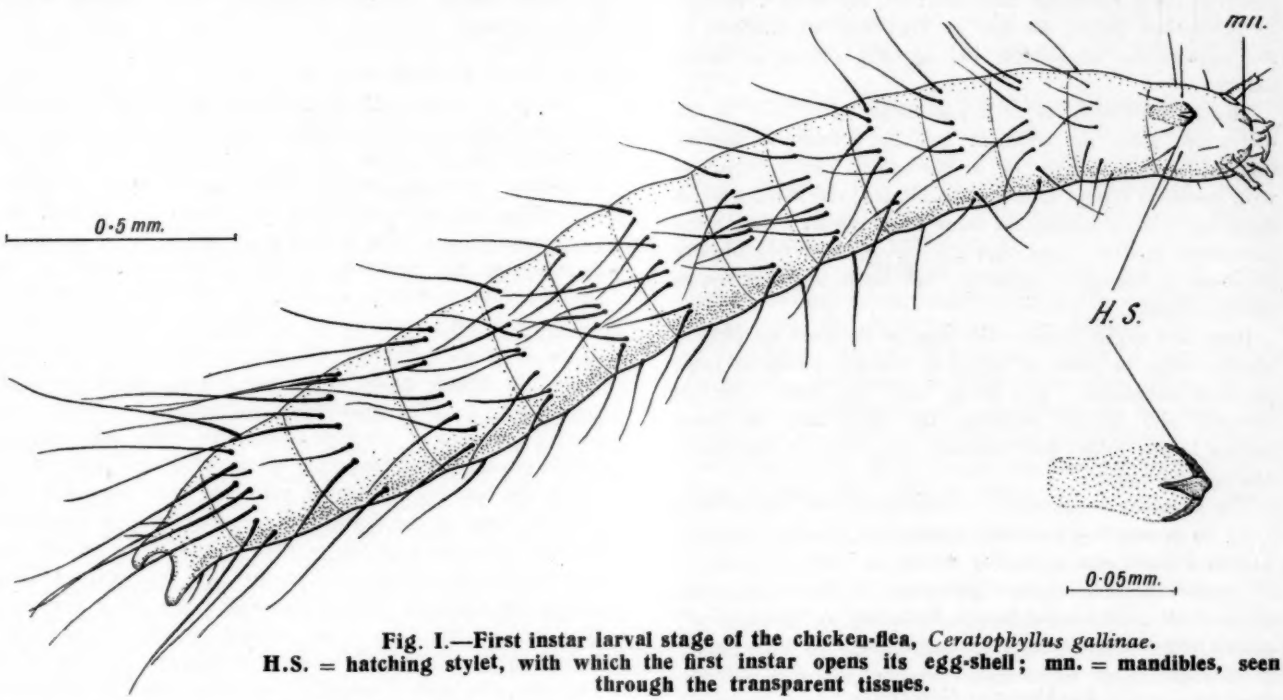

Fig. I.—First instar larval stage of the chicken-flea, *Ceratophyllus gallinae.*
H.S. = hatching stylet, with which the first instar opens its egg-shell; mn. = mandibles, seen through the transparent tissues.

them to leave the nest. Luckily, fleas can be easily dealt with if one knows their habits and bears in mind that the larva is easily destroyed but that the adult flea can live for several months without food.

Development of the Chicken Flea.

The female flea attaches her minute whitish eggs to pieces of straw, bark, or dried leaves at the bottom of a nest box or in the dust below the box. The eggs are not easily distinguished from those of the red mite (which, however, are smaller), even by aid of a lens; they are usually deposited either singly or in groups of twos and threes. Given suitable temperature conditions, the first instar (or larval developmental stage) emerges within five to seven days and moves about actively; it resembles a minute maggot and can be detected with the naked eye; with a microscope one can observe its distinguishing feature, consisting in a brown piercing stylet by means of which it opens its way out of the egg. The larva is furnished with a pair of serrated mandibles, which enable it to chew up its food, which consists in dried blood voided by adult fleas. Within five days or a week this larva increases in size and, circumstances being favourable, will burst its skin and emerge as a II instar, having shed its stylet and presenting slight differences which distinguish it from the preceding stage. It is equally active and does not differ in habits from the first stage, since it avoids the light and feeds on dried or freshly voided blood. A further mould gives rise to the III instar, which is larger and more active and voracious than the previous two. I have seen a III instar attack a gorged red mite and suck it dry. After the usual period of five days the III instar quietens down, becomes immobile, voids the digested blood and turns whitish and fat. It then bends in two and spins itself into a cocoon which may be attached to a stick, dried leaf, etc., and in any case gets covered with coarse dust and fragments of dirt, so as to be effectively "camouflaged." In this cocoon the III instar finishes converting its intestinal content into a fatty substance, voids the last remnants of digested blood into the cocoon and in the course of a fortnight or three weeks is metamorphosed into a white pupal stage, which gradually turns brown and the flea emerges with its full measure of activity.

There is considerable difference between the vitality of the adult flea and its larval stages; the I and II instar of the chicken flea larva, kept without food, will dry up and die in the course of a week or ten days; the III instar can tide over a period of famine by spinning itself in its cocoon, but the adult chicken flea will live merrily for four months at least in a closed flask. The larvæ can only develop in the dust apart from the hen; the adult flea needs the hen only at intervals. These facts guide the hygienic measures for the eradication of fleas.

Control and Eradication of Chicken Fleas.

The flea larvæ are easily got rid of by clearing out the nesting hay, sweeping up the dust under the nest boxes and burning it in a destructor; the same must be done with all dry droppings in and around the boxes. The nest-boxes can then be creosoted and pine wood shavings recommended for bedding. The adult fleas are not so easily dealt with, for they hop away during these times of stress and return when the hygienic activity is over. Still, by concurrently dealing with the hens as recommended for mallophaga, one will settle the fleas which remain on the hens, and keeping the boxes clean will avoid the breeding of the larval stages. Constant control will result in eventual complete eradication.

3.—Bugs = *Cimicidæ.*

Pigeon Bug, *Cimex columbarius,* Jenyns. Though not common in this country, the spread of this pest from pigeon-lofts to hen-houses and then to the farm-house has been

observed, with resulting discomfort for the family, because in susceptible people the bite of bugs will be followed by the appearance of intense itching and severe urticarial rashes.

The identification of this particular pest, that is, its distinction from the common bed-bug, *Cimex lectularius* (Merrett), is a matter of measurement and comparison with standard types. Life cycle is simple; the small greyish eggs are laid in packets in some dark crevice; they hatch out about a week after, and the larvæ, after five moults, at about a fortnight's interval, are adult bugs in ten to eleven weeks.

Bugs are night feeders and can be detected by placing muslin traps in front of crevices, cracks, joints or other probable situations. The small bags are stuck over the opening and in the morning the bugs may be found hidden in the folds; pure creosote can then be injected to destroy the eggs.

The complete eradication of bugs from any old building is by no means easy; cyanide fumigation has been resorted to and I have seen a fatality result in South Africa from its unskilled application. Creosoting, limewashing, trapping of all crevices (in houses including furniture) if repeated will eventually destroy the bugs.

4.—Mites = *Gamasidea*.

Red Mite, *Dermanyssus gallinae*, Redi.

This is a dangerous blood-sucker, which induces severe anæmia in fowls and causes the death of sitting hens, whose marrow is found pale and aplastic and whose blood-corpuscles are diminished in numbers, with a low hæmoglobin index. The mites are said at times to penetrate the auditory meatus and cause cerebral symptoms.

They will, moreover, attach themselves to ducks and geese on a farm and have even been observed to attack horses and man, causing rashes and dermatitis in the latter case. Apart from these exceptional infestations, they produce considerable restlessness in sitting hens, affecting egg-laying and cause fowls to go thin and anæmic.

Detection and Recognition.

This is not always easy, because the mites will retire to crevices and out-of-the-way spots during the day and only return to suck blood during the night. In one instance I found considerable numbers behind the lock of a corn-bin; in another, enormous numbers among the rubbish of an old barrel outside a large hen house. If the eggs of chickens are found covered with small dried blood spots the presence of *Dermanyssus* or fleas is practically certain.

Life Cycle.

The life cycle of the red mite is simple and takes place apart from the chicken. The gorged female will lay small white eggs in numbers in crevices or in the dust, litter and dried droppings; these hatch out within three days, given the right temperature and degree of humidity in the surroundings. A minute, scarcely visible white six-legged larva emerges, which sheds its skin and can transform itself into the next stage (first nymph) without taking nourishment. Successive moults occur within a week, when it has reached maturity. Under experimental conditions the mites can live without food for a month at least, therefore, under natural conditions, very probably three times as long.

Control and Eradication.

This is by no means easy, particularly when dealing with old hen houses, but the damage caused by the unhindered multiplication of these mites is so great that drastic measures, such as partial reconstruction and abundant creosoting and limewashing of dilapidated hen houses, can be recommended. The first step is, of course, a thorough clean-up of the nest-boxes, with particular attention to the dust and detritus at the bottom and below the boards; all litter to be burnt in the destructor. Dropping-boards to be cleaned, removing all dry droppings and the dust below the boards gathered up and burnt. Then thorough creosoting of all woodwork, particularly corners and joints; injection of creosote into worm-holes and crevices in old wood; but if these can be removed and replaced, so much the better; subsequent painting with limewash will stop up many of the cracks. Since the mites are nocturnal feeders, paraffining of the perches is indicated; an alternative method is to provide perches on four-pointed legs, which are placed in shallow tins with crude oil or kerosene. No part of the hen house should escape examination, including the roof, from which it is thought that the mites may drop on such " security " perches. Special elaborate perches with cups containing petroleum are used in hatcheries where valuable fowls are subject to the nightly attacks of these pests; but even these are unsafe if an effort is not made to destroy the Dermanyssus in their haunts, though these are usually difficult to get at and may be located in unsuspected situations in the roof or outside the hen house.

Feather-Mite, *Liponyssus sylviarum*, Canestrini and Fanzago.

This gamasid mite has been found in England by Taylor (1930) on fowls and in which it caused extreme weakness. It has been known to live on sparrows and in sparrows' nests and also on pigeons, but is not considered to be common in this country.

Morphologically similar to *Dermanyssus gallinae*, but differs in this, that it sometimes spends its whole life on a chicken.

Pathogenic action.—Apart from the reduction in egg output, anæmia and weakness have been described. The feathers around the vent develop a dirty, ragged appearance and the skin is reddened and irritated by the blood-sucking habits of the Liponyssus. If mites are found on the eggs or in numbers on the fowls during the day-time, the probability is that they are Liponyssus.

Control and Prevention.—This is similar to that recommended for Dermanyssus, except that with this mite eradication is somewhat easier. Taylor (1930) found painting of the perches with nicotine sulphate and paraffin on two occasions sufficient. Bishopp and Wood (1926) recommend their sodium fluoride and sulphur bath (see page 1133).

C.—Internal Mites; Acarina.

Scaly-Leg Mite, *Cnemidocoptes mutans*, Robin and Hanquetin.

This microscopical colourless mite takes advantage of some roughness or abrasion in the legs of fowls to penetrate and settle in the deeper layers of the epidermis, where it

causes irritation and proliferation of the epithelial cells. It is relatively easily detected by detaching some of the scales, breaking them up and examining them under a microscope; the round mite can then be seen moving between the stratified hypertrophic cells.

Cnemidocoptes mutans, like many other parasites, will show a definite preference for certain fowls in a yard and, moreover, induce a varying degree of epithelial reaction in different hens; some chickens will respond with a scarcely noticeable roughness, whilst others will develop such a degree of scaly-leg as to be impeded in their movements.

Squamous epithelial cancer of the metatarsal joint in a fowl, as the result of the irritation set up by this mite, has been described by Teutschlaender (1921).

Treatment and Prevention.—This is particularly simple and effective; an old toothbrush and a tin of kerosene is all that is required. Scrub the scaly parts well, at five day intervals, with the toothbrush dipped in the kerosene and the scale will drop off after the second or third application. A little lanoline or vaseline will complete the cure. Preventive measures against a repetition of the infestation are identical with those recommended for the hygienic management of poultry; clean flooring, change of run at intervals.

Depluming Scabies Mite, *Cnemidocoptes lævis*, var. *gallinae*, Railliet.

This unsightly ailment may first appear on the back and then spread to the neck or thighs and rump; in other instances only the neck or even one side of the neck is the part affected. The irritation resulting from the infestation of the mite frequently produces feather-picking (in common parlance " vice ") and the condition may become a revolting sight, because the skin is red, inflamed, puckered and bleeding. Valuable fowls are at times destroyed for this reason, whilst depluming scabies is a curable and preventable ailment.

Diagnosis.—If loss of plumage is suspected to be due to this mite, a few feathers should be plucked from the edges of the more evidently diseased parts and the cells at the base of the quill and those of the skin surface carefully examined under the microscope. The mite is round, colourless, with short, stumpy legs.

Treatment and Prevention.—Depluming itch is commoner in the late spring or summer and therefore dipping of the hens in a warm sodium fluoride-sulphur solution can be recommended, particularly as this is also effective in relation to mallophaga, fleas and other vermin.

Formula of Bishopp and Wood's Sodium fluoride and Sulphur dip.—Sodium fluoride 1½-oz.; Flowers of sulphur 4-oz.; Soap ½-oz. Dissolve in two gallons of warm water in a wooden tub. The sulphur will not dissolve but remain in suspension. Soak the hens thoroughly, ruffling the feathers so that the solution may reach the skin. Allow the hens to run about in the sun to dry in a clean run.

Should this not prove completely effective, an ethereal sulphur ointment can be thoroughly rubbed in the inflamed and bald patches; the inflammation will subside and new feathers grow in a few weeks' time. The ailment is both curable and preventable and there is no need to kill or destroy poultry because of the infestations of this mite.

Air-Sac Mite, *Cytoleichus nudus*, Vizioli.

This is a transparent, round mite, which is frequently found in the tissue of the air-sac and also within the lung.

Detection in Tissues.—When broncho-pneumonia is suspected to be associated with mites, their presence can be detected by snipping small pieces of the lung and pressing them between two micro-slides and examining with a 3-8th-in. nosepiece lens. The immobile mites are seen in the connective tissue septa.

Transference.—This is uncertain, but thought to be direct, through fowls coughing up mucus with the mites in them. The life cycle has not been worked out.

Pathogenic Action.—I have seen them in large numbers in broncho-pneumonia of fowls; also where there has been a massive localisation of tuberculosis in the lung; their action in the latter instance can be compared to that of silicaceous dust in inducing experimental tubercle in the lung of the rabbit (Kettle, 1930).

Tissue Mite, *Laminosioptes cysticola*, Vizioli.

This mite is about the same size as Cytodites, but is distinguishable owing to its elongated shape with a line of demarcation between cephalothorax and abdominal segment and its short, thickset legs. The calcified remains of this mite are frequently seen under the transparent skin of the breast of fowls, in the shape of yellowish millet-seed-shaped granules.

Pathogenic Action.—These mites irritate the surrounding tissues and can be associated with the presence of numerous small fibrous nodules in the skin. Under the microscope all degrees of resorption of dead mites can be observed, beginning with a congregation of eosinophile cells, followed by the gradual disintegration of the mite and the eventual calcification of the nodule in which only scanty chitinous fragments can be detected, and then only by dissolving the chalky deposit by weak acid.

Control.—Since the life cycle of these mites is yet uncertain and the damage they cause not very obvious, no definite treatment can be recommended, except that the observance of hygienic rules is sure to diminish the incidence of these and other parasites.

D.—Endo-Parasitism; Helminths.

Fowls can be infested by a large variety of helminths, and in view of the considerable biological divergence existing between the life cycles of nematodes, tapeworms and flukes it is scarcely possible to recommend sanitary measures which are universally applicable in relation to the morbid conditions these parasites cause in fowls.

As a general rule the prompt segregation of all obviously diseased fowls or chicks should be immediately carried out; the necropsy of a few to identify the extent of the parasitism can be scarcely avoided and then it will be necessary to decide whether the individual treatment of the parasitised survivors is economically worth while. Whether a change of the run will help matters depends on the life cycle of the helminth involved.

1. Roundworms = *Nematodes*.

Gapeworms, *Syngamus trachealis* (Montagu) von Siebold.

This nematode is the cause of a widespread and dangerous ailment in chicks through the localisation of the forked

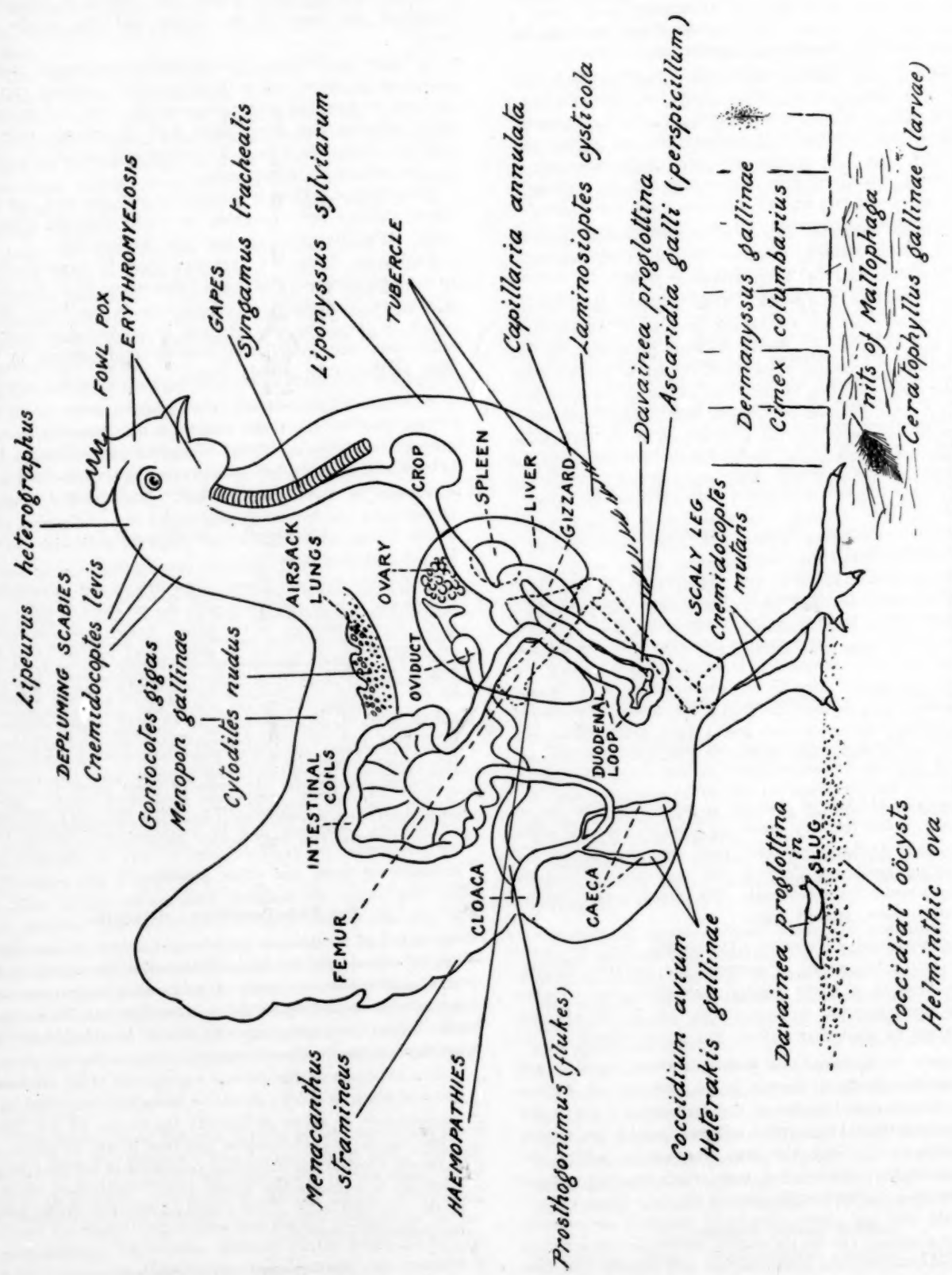

Fig. II.—Common Parasites of the Domestic Fowl.

chicken worm in the trachea, where it can be found, by slitting open the trachea, usually surrounded by much blood-stained mucus, but firmly adherent to the tracheal walls.

Pathogenic Effects.—The visible result of this infestation usually becomes noticeable through the chicks running about with open beaks whilst subject to fits of coughing and wheezing; choking and broncho-pneumonia may follow and mortality become a serious question particularly among chicks of a month or upwards. This nematode is, according to Eloise B. Cram (1927), originally a parasite of the turkey, since it was observed in this bird in Baltimore in 1799. Adult turkey do harbour the worm fairly frequently, whilst chickens of a couple of months of age are more easily infested.

Life Cycle.

This has been worked out by Ortlepp (1923). Since male and female worms are permanently united in copula it was thought that the eggs could only reach the exterior on the death of the female worm; this is not so, not only because eggs can be frequently found in the fæces of infested fowls, but because the actual oviposition has been observed in a similar forked worm of cattle in India (*S. laringeus*). The eggs in the fæces will take about a week to produce infective larvæ under experimental conditions, during which time they will undergo one moult; these infective larvæ are generally ensheathed, are not very active and cannot resist complete dessiccation, though they will survive 14 days or more in a humid atmosphere. Ortlepp (1923) found that 20 out of 22 chickens could be infested by squirting these infective larvæ into the mouth cavity; they then were found soon to have reached the lungs, where they grew in size and underwent two further moults; the final or fourth stage was reached five days after infection, when the larvæ copulate, migrate into the trachea, where they attain sexual maturity within 10-14 days later, so that the whole life-cycle is completed within a month. It is quite possible that *Syngamus trachealis* is disseminated by starlings and other wild birds and that the turkey is a frequent host, with slight symptoms, has been mentioned.

Treatment, Control and Prevention.

The prompt segregation of all diseased fowls is indicated and treatment of ailing chicks by means of a feather dipped in equal parts of turpentine and olive oil and passed up and down the trachea; this succeeds in detaching a certain number of worms and others will be coughed up. The remaining healthy fowls should be removed to a fresh piece of ground and the old run, which is no doubt covered with droppings containing numerous syngamus eggs, should be first treated with lime, then forked over, and if possible, sown with coarse grass or mustard and allowed to lie fallow for a year. If no other run is available, the fowls should be kept penned up with constant observation for further " gapers " which, as soon diagnosed, must be segregated, the litter burnt and the boards thoroughly cleaned and disinfected. In practice it will be found that these different preventive measures will soon rid a poultry yard of gapes and that any superfluous energy is best concentrated on cleaning up the houses and runs, preferably to treating the chicks.

Large Fowl Ascarid, *Ascaridia perspicillum* (Rud).

These large nematodes, 2-3 inches in length, are frequent in poultry and considered to be harmless inhabitants of the intestine; but though they may not cause obvious disease in adult hens, they induce an avoidable mortality in chicks, which is but too often taken as a necessary evil.

Effects of Ascaridiasis.

In chicks this becomes noticeable through their losing condition, appearing weak on their legs or going about with their wings drooping. Diarrhœic symptoms may follow, with blood-stained droppings; the circulating blood may show an undue number of immature erythrocytes. All these symptoms, however, are not definite and may occur in many other morbid conditions; the diagnosis must be secured by finding the nematodes in the duodenum or jejunum. Wry-neck in chicks is at times induced by these ascaridia.

Life Cycle.

This has been carefully investigated by Ackert (1927) and found to be relatively simple and direct. The female ascaridia lays numerous mature but non-infective microscopical eggs; these pass out in the droppings and, given suitable temperature and moisture conditions, develop a small enclosed larva within two weeks. If the eggs are picked up at this stage by a chick, the ascaridial egg-shell will protect the larva whilst passing through the crop and gizzard, so that it will be enabled to escape through a hole in the covering envelope whilst in the duodenum, where the larva will fix itself to the walls of the intestine. It then grows and develops into the adult worm which detaches itself from the intervillar spaces and lives free in the lumen. This cycle is complete within eight weeks. *Ascaridia perspicillum* has been described from the interior of eggs, because, though exceptionally, it appears to bore its way through the intestine and wander through the tissues.

Treatment and Prevention.

After diagnosis by finding the worms in diseased chicks, treatment should consist in segregation of the diseased chicks and dosing with 0·5 c.c. of carbon tetrachloride, followed by mash to expel the dead worms. Adult fowls should be diagnosed by searching for the ascaridia eggs in the droppings, but this is a laborious procedure. Treatment by carbon tetrachloride (4 c.c. for each adult bird) and changing the run and reconditioning the old run, as recommended for the Syngamus worms, should deal effectively with the infestation or at least keep it well under control.

Cæcum Worm, *Heterakis gallinae*, Gmelin.

These visible (about ¼-in. long) thin worms are frequently found in the cæca of fowls, either free in the lumen or rolled up in a tangled mass in one of the end pouches or even adherent to the sides of the bowel. Males can be distinguished by the aid of a lens, since they are smaller, usually curved like a point of interrogation or a semi-circle. Females are larger, white and straight or only slightly curved.

Life cycle is direct, since the mature ova are ingested by chicks or hens and develop in the intestine. As in the case of other similar nematodes, re-infection must be common.

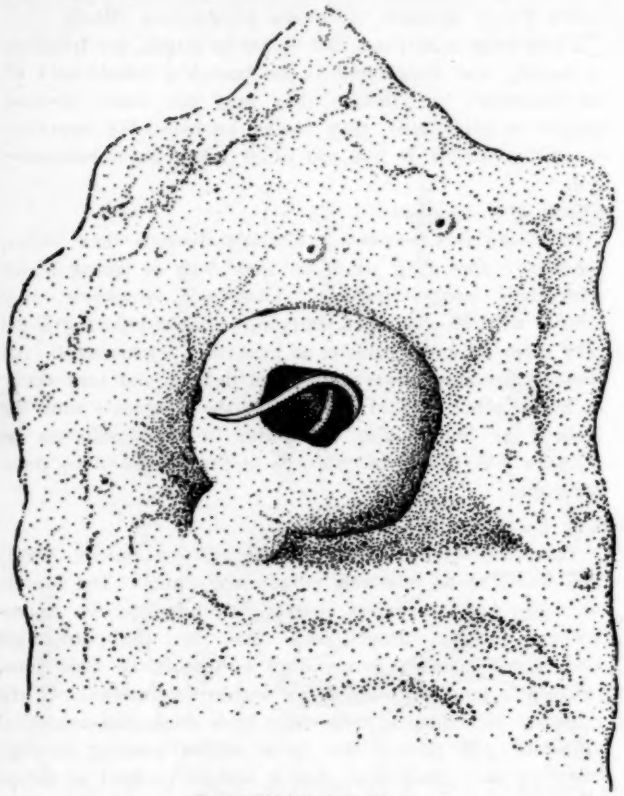

Fig. III (Original).

Deep ulcer of the cæcum of Fowl produced by the Nematode *Worm (Heterakis gallinae)*.

Pathogenic Action.

These nematodes erode and irritate the intestine, an example of which action is illustrated in Fig. III, which is drawn from nature. The penetration of saprophytic and other bacteria into the circulation through such ulcerations can produce ill-health in chickens. The rolled-up masses of Heterakis may cause obstruction of the intestines and death of the fowl through a disease known as typhlitis verrucosa, the symptoms of which are intense irritation of the bowels, with alternating constipation and diarrhœic droppings; on necropsy, a peculiar active proliferative inflammatory reaction may have formed around the worms in the cæca and elsewhere in the intestines. Moreover, chronic ulcers may be detected in which no worms are to be found, for Heterakis give rise to ulcerated spots in any part of the bowel and then move actively elsewhere, or are removed and the pathological necrotic process, once begun, will continue for some time as the result of bacterial action.

Individual Treatment.

The infected birds should be placed in isolation pens, because one of the results of the treatment will be the voiding of fæces containing numerous worms and helminthic eggs, some of which may still be infective.

Bushnell and Brandly (1930) recommend rectal injections with a mixture of one drachm of oil of chenopodium in six oz. of olive oil. The rectum can be reached by following the lower floor of the cloaca, when the injection can be performed with a small blunt glass nozzle fitted to an enema syringe; only light pressure to be used. It is calculated that this treatment will get rid of 60 per cent. of the worms at the first application; it should therefore be repeated at five days' interval.

Prevention is the same as for Ascaridia; by avoiding re-infection an effective control can be accomplished, because the worms, contrary to a widely-held belief, do not multiply in the intestine but after having reached the outer world as a fertile egg incubating in the soil and then going through the larval stage once, they are again ingested by a chicken. [Graybill (1921), Uribe (1922.)]

2. Tapeworms = *Cestodes.*

Cestodes in fowls present a somewhat complicated problem, because they require an intermediary host for the completion of their life cycle; where these are known they have been found to be flies, earthworms, slugs, snails and beetles, each cestode having a specific and sometimes an alternative intermediate.

About 25 varieties have been described from fowls; some may occur singly, or in small numbers, like *Davainea cesticillus* (Molin) Blanchard; others like *Amoebotænia sphenoides* (Raillet) Cohn, may be present in thousands. Their size varies considerably from 9-10 inches in length, like *Davainea echinobothrida* (Megnin) Blanchard, to a couple of millimeters like *D. proglottina* (Davaine) Blanchard.

Minute Chicken Tapeworm, *Davainea proglottina.*

This cestode is cosmopolitan, having been recorded from parts of all five continents and is frequent in fowls in Great Britain; for these reasons it can be taken as an example.

Anatomical Localisation.

The anatomical localisation of this fowl tænia is apparently the same everywhere; firmly attached to the intervillar spaces in the duodenal loop.

Pathogenic Reaction.

The general symptoms of tæniasis are described, such as emaciation, effusions of blood in the intestinal coating, enteritis. In over 30 hens I have found this cestode associated with a dangerous form of progressive anæmia (erythromyelosis). It has also been described as present in about half the fowls suffering with peri-neuritic lymphomatosis or fowl paralysis.

Life-cycle.—This requires the presence of an intermediate host, of which one is a common garden slug *Agriolimax agrestis.* Experimentally, it has been observed by Chandler (1923) that one can feed living proglottids on lettuce leaves, to these slugs and that ten days after the slugs will be found to contain about twenty larvæ, in an early stage of development. Specimens collected from a chicken yard were found naturally infested with 150 or more tailless cysticercoids of *D. proglottina,* which were heart-shaped and possessed a gelatinous outer coat. Some of these cysticercoids were free in the body cavity, but many were imbedded in the tissues, particularly the walls of the alimentary canal. Portions of slug with cysticercoids were fed to two hens, which twenty days later showed numerous active Davainea proglottids in the droppings. These experiments do not preclude that other alternative intermediary hosts may occur in nature or in different countries.

Treatment.

This should be individually applied and consist in prompt isolation of the birds which are suspected to harbour tape-

worms; after fasting for six hours the fowls can be given a table-spoonful of Epsom salts dissolved in water and mixed with mash for every six fowls and the droppings examined for strobila, which should then appear. If present, thymol in capsules, one to two grains, is indicated—this treatment to be followed at five day intervals till the droppings are free of strobila.

Control and Prevention.

The most suitable point of attack in this instance is the slug, whose presence in fowl-yards it is difficult to avoid completely. The manuring of lettuce beds with infected fowl droppings and then feeding the outer lettuce leaves (with slugs) to the fowls is an obvious cycle of infestation which indicates its preventive measures. In some farms an infestation ratio of 80 per cent. can be detected, with corresponding results in the mortality of fowls (" rotten bad luck with my fowls during the past three years.")

The treatment of the fowls as suggested, followed by their isolation on intensive lines and a change of run for the remainder, is a course which has been found to give practical results.

3. Flukes = Trematodes.

These are not common in this country in chickens, but do cause heavy mortality and disease in ducks; the difference is due to the fact that part of the life-cycle of many trematodes is passed in water snails and, accordingly, ducks, geese, swans and other semi-aquatic birds are more easily infected. But even pigeons and doves which are grain-feeders are at times found accidentally infested through swallowing grass or seeds soiled with the encysted cercaria. About 15 species of trematodes have been described as occurring in the domestic fowl in different countries, against about 20 in the duck, but this proportion of species does not give a true idea of the numbers involved, for there must be large tracts of dry country where trematodes in chickens do not occur. In Holland, parts of Germany and the Baltic Provinces heavy mortality of laying hens (and these only) has been traced to the penetration of the oviduct by the flukes *Prosthogonimus pellucidus* and *P. longus*. Acute inflammation of the oviduct results, with its attendant evils of burst yolks, impacted eggs and peritonitis.

Life Cycle of Trematodes.—This usually follows somewhat similar lines. The adult flukes are hermaphroditic and, if they have an intestinal habitat, will empty their eggs into the lumen of the gut, whence they reach the exterior; if these drop into water or heavy moisture they will develop into an infusorian-like creature, supplied with cilia (the miracidium) and which swims about actively till it finds a suitable intermediary host, usually a water-snail, whose respiratory apparatus it penetrates. Here the miracidium, after losing its cilia, develops into a multicellular parasite called a sporocyst. The sporocyst then grows into a larger shape with a rudimentary digestive canal, this change taking place within the limiting membrane of the sporocyst. At a certain moment these new shapes, called redias, will stretch out, leave the membrane and migrate into the liver of the mollusc, where they may multiply into other redias or develop directly into a cercaria, which is an extremely active creature, somewhat in the shape of a tadpole and of sufficient size to be seen with a pocket lens. Frequently the snail dies as the result of the cercaria infestation and the cercaria is then set free in the water, where it soon exudes a slimy coating and encysts on a leaf or blade of grass. Some aquatic bird then swallows the cyst, which is dissolved, disclosing a minute fluke which penetrates the wall of the stomach, joins the circulation and then settles down in some favourite organ—liver, lung or intestine, and the cycle can recommence.

Control and Prevention.

The life-cycle of the fluke is described somewhat in detail, since it may explain the difficulty of dealing with such infestations in the case of aquatic birds which can roam at large, such as swans or ducks. Obviously, by getting rid of all water snails the infestation would cease, but that is not a practicable suggestion. If losses among ducks or geese are heavy owing to flukes, then feeding in closed spaces with a cemented pond will have to be resorted to.

E.—Endo-Parasitism; Protozoa.

1. Coccidia = Sporozoa.

Coccidium, *Eimeria avium*, Rivolta

These dangerous microscopical protozoa, on being picked up by chicks, can multiply in the intestinal villi, causing them to necrose, with resulting diarrhœa and effusion of blood. The disease is commonly known as " white diarrhœa," but the droppings are usually stained with blood and in the late stages nearly pure blood is voided. Adult birds do not suffer severely from the infection, but the danger consists in their contaminating the ground boards and soil and thus giving rise to heavy mortality in chicks; moreover, any chicks which survive the disease are sure to grow up stunted and of little value. There is every reason for an energetic control and prevention of coccidiosis once it is detected in a poultry yard.

Pathology of Coccidiosis.

As the result of anatomical and experimental observations, Tyzzer (1929) has concluded that coccidiosis in gallinaceous birds is a mixed infection due to four distinct species of coccidia, viz.: *Eimeria tenella* Raillet et Lucet, 1891; *E. mitis*, *E. acervulina*, *E. maxima*, Tyzzer (1929). The one causing heavy mortality in chickens is *E. tenella* and Tyzzer relates (p. 293) the following example to demonstrate its pathogenicity:—

Mortality in Severe *E. tenella* Infection.

Chickens in which the infection ran its natural course:—

Died at 5 days	14
Died at 6 days	48
Died at 7 days	5
Died at 13 days	1
Died at 17 days	2
Recovered	14
Total	84

The other Eimeria are not as dangerous, no deaths occurring even after heavy experimental infections. As the result of numerous observations, it was found that each species of coccidia develops an immunity in the bird host, which immunity is, however, only specific and effective against one particular species. As a practical consideration, it can be noted that Tyzzer found that even when the cage, food and water of the chicks were sterilized, yet such measures were proved to be ineffective if the cages

were kept in the same room and looked after by the same attendant. The damage done to the intestinal epithelium by the Eimeria is usually very extensive, but, in addition, secondary bacterial infection is an important accessory cause of morbidity; if a superadded infection with *B. (Salmonella) pullorum* takes place, the mortality may easily reach 100 per cent.

Life Cycle of *Eimeria tenella* Tyzzer, 1929.

The mature oöcysts are accidentally ingested by a chick and, having reached the duodenum, four oval spores develop and are released; from each of these two actively motile sporozooites emerge and invade the epithelial cells of the intestinal villi. Here they alter their shape, and multiply, with the result that many hundreds of thick, fusiform merozoites develop within the schizont, which eventually is squeezed out into the lumen, whilst the nucleus of the epithelial cells hypertrophies. This is the first generation; the extremely small merozoites (1-1½μ by 2-4μ) get scattered in the glandular portion of the cæcum and there penetrate further epithelial cells and go through another process of schizogony which is again repeated, each time with a somewhat diminishing number of merozoites. The third generation merozoites are not numerous and it is probable that they now go through a process of gametogony (sexual reproduction) when macrogametocytes (mother-cells) and microgametocytes (male cells) are differentiated.

The macrogametocyte gives rise to a daughter cell, the macrogamete, whilst the microgametocyte produces numerous biflagellate active microgametes, which fertilize the macrogamete by penetrating it at a thin spot known as the micropile. The nuclei of the two gametes conjugate, a zygote results which is surrounded by a membrane and is then called a oöcyst or egg-stage, within which the nucleus divides into two and then four nuclei, which give rise to four rounded bodies or sporoblasts. These become oval and are termed sporocysts, from which develop spores containing two young sporozooites, which, on rupture of the oöcyst, are released and mature for infection.

The greatest damage of the intestinal mucosa takes place during repeated schizogony, but the sexual process ending in the formation of the oöcyst is particularly important in relation to the further transmission of the disease to other chicks.

Treatment.

There is no treatment that can be recommended to give lasting results or which can repay the trouble, even though mortality can reach 100 per cent. in a freshly infected brood. Rigorous measures are indicated, which should prevent the recurrence of such disasters.

Control and Prevention.

Immediate culling out of all obviously diseased chicks, killing and burning their carcasses in the destructor. Gathering up all litter and burning it; cleaning of the boards by scraping and washing with hot water and caustic soda; drying in the sun and then painting with creosote, pure. Spraying of the floor of the hen house with a hypochlorite solution and changing of the run; digging up of the soil and planting with coarse grass and the yard not to be used for another year. Gradual killing off of all the survivors and examination of the intestines for signs of chronic coccidiosis, in which case chicks must be kept away from the new ground, and the hen house not used for young birds till it is again thoroughly disinfected and all litter burnt.

All these methods are relatively costly and require attention and expenditure of time and money, but any poultry farmer who has allowed coccidiosis to take hold of his fowls, will not continue poultry keeping for long. The spores are very resistant and, wherever possible, droppings, litter, bedding should be burnt and not used as manure, in view of the danger of spreading the disease.

Note.—The treatment and prevention of bacillary white diarrhœa in chicks, caused by *B. (Salmonella) pullorum* infection, is fully dealt with in Bulletin No. 6 of the Ministry of Agriculture.

F.—Mycotic Diseases of Fowls.

Favus Mould—*Sabouraudites, gallinae,* Megnin.

So-called "white comb" in fowls is due to a fungus (*Lophophyton*) *gallinae*. The chronic condition usually begins in the shape of small white or light grey spots, no larger than pin-head size, on the comb and gills. These spots increase to patches, coalesce and may eventually spread to the feathers of the neck, causing them to break off or fall out, leaving unsightly bald irregular areas. The fowls then acquire a peculiar mouldy odour. The ailment is easily communicable from one fowl to the other and rabbits and man have also been found susceptible.

Diagnosis.

In early cases the causative fungus is relatively easily detected in the white initial patches; later, when the infection has become obscured by inflammatory cells and detritus, such as dried serum, the search may require a little time.

Control and Prevention.

Prompt isolation of all diseased fowls and treatment in separate pens till they are completely healed; general disinfection of poultry house; all damp litter and refuse to be burnt.

Treatment.

This is simple and effective in the early stages; repeated application of tincture of iodine will cure the condition. If the disease has spread to the feathers the application of a mild iodine ointment will be found very useful.

2. Black Mould, *Aspergillus fumigatus,* Fresénius.

These fungi cause Aspergillosis of fowls and brooder-pneumonia of chicks, and may belong to one of several varieties such as *Aspergillus fumigatus, A. glaucus, A. flavescens,* and *A. candidus*. Though commoner in pigeons, particularly if they are forcibly fed with mouldy corn for fattening purposes, the infection may also occur in chicks in brooders which are not sufficiently ventilated and from these may spread in a more chronic form to the hens. In chicks the lesions are principally located in the respiratory system, which includes the air-sacs. There are usually a greyish or dirty greenish membrane on the trachea, numerous scattered purulent foci in the lungs, which are heavily congested throughout; thick membranes may nearly fill the air-sacs.

In the adult fowl the lesions of the chronic form resemble avian tuberculosis, not only to the naked eye, but also under the microscope; because the infection appears to spread through the intestine to the liver and spleen. The detection of mycelial threads and lack of acid-fast rods should differentiate the diagnosis.

Control and Prevention.

Diseased birds should be immediately culled out and removed to isolation pens; the value of any treatment is doubtful. The origin of the fungus should be discovered and if found in the corn, then this should be thoroughly boiled before being fed to the fowl and, once the consignment is finished, the corn bins disinfected. At the same time the brooder should be cleaned out, the litter can be placed on the manure heap and the brooder thoroughly disinfected by wiping with a strong creosote solution.

Adult birds which show symptoms of illness should be also isolated and tentatively treated with a teaspoonful daily of a 5 per cent. Pot. iod. solution, and not allowed to rejoin the other fowls till cure is assured.

3. Hay Mould, *Actinomyces dassonvillei,* Brocq-Rosseu.

This streptothrix disease has, so far, only been reported from the Continent, but since it runs a mild and chronic course and causes but slight symptoms, single cases may appear in this country. The causative germ is *Actinomyces (Nocardia) dassonvillei.* During life anæmia and "going light" are the most evident symptoms of the disease. When death occurs the peritoneum and abdominal organs will be found covered by a thin greyish membrane with whitish scattered spots.

Treatment.—Identical to that recommended for aspergillosis.

Control and Prevention.—Strict isolation of diseased fowls and clean-up of houses. The disease does not spread easily.

G. Avian Tuberculosis.

Fowl Tubercle "Bacillus"=*Mycobacterium tuberculosis avium.*

The microbe causing tuberculosis in fowls can be readily distinguished in artificial culture from the bacilli producing consumption in man and cattle, but the tubercles occurring in birds resemble those caused in mammals by human and bovine strains.

Though avian tuberculosis is transmitted from fowls to pigs, sheep and rabbits (and mice) it cannot be easily inoculated to other mammals so as to cause generalised lesions, though M'Fadyean (1918) described an instance of spontaneous avian tuberculosis in the horse.

Human and bovine tuberculosis cannot be inoculated to the fowl, but the danger of unrestricted avian tuberculosis is to be found principally in its spread to pigs on the same farm. Cornell and Griffith (1930) have shown that in 93 pigs with tuberculous glands, in 31 the avian type was detected, isolated in pure culture and identified. An avian strain was also cultured from generalised tuberculosis in a pig by Griffith (1928). This dangerous correlation between tubercle in fowls and pigs [and, though rarely, also sheep—Griffith (1925)] should claim the attention of veterinarians throughout the country.

Pathology.—Avian tuberculosis is predominantly a disease of the adult hen and cock, which get infected by ingesting food soiled with the droppings from other fowls suffering from the ailment. In nature, the course of the infection is slow, and for this reason also it is a morbid condition more frequently found in chickens which are on a free run on a farm where one is usually satisfied with an average output of 60-80 eggs a year per hen and the birds are not culled but allowed to reach a ripe old age. These conditions are all in favour of the microbe and it is understandable that, where poultry are closely watched, the loss of condition and low egg output, which are among the early symptoms of tuberculous infection, are soon noticed and remedied. When chickens are seen to be "going light," the tuberculosis is already well advanced, but I have observed deaths to occur through what was diagnosed as "bowel-stoppage," but on necropsy proved to be due to a single intestinal tuberculous lesion which had brought about complete occlusion. Further deaths occurred soon after in the same farm, with advanced and generalised avian tuberculosis. Lameness and joint affections are not uncommon, even in the early stages, and should call attention to the presence of avian tuberculosis in the fowl stock. Anæmia is also a frequent symptom, this being due to lesions of the bone-marrow.

The morbid alterations found on necropsy are well known, and consist in numerous irregular-sized, round, cheesy deposits in the spleen, liver and bowels; the lungs frequently show minute pin-head-sized tubercles, but massive tuberculous lesions involving a great part of the lungs are not frequent and, when present, I have found them frequently associated with the mite *Cytoleichus nudus,* For method of detecting this in lung tissues see page 1133.

Diagnosis and the Avian Tuberculin Test.

It has already been said that avian tuberculosis is a disease of the adult fowl, and that its initial symptoms can be easily overlooked. It has happened that prize birds have been sent overseas at great expense and, three months after arrival, began going light and eventually died of tuberculosis and, what is worse, introduced and spread the infection. Once a fowl in a run is found to have tuberculosis, no time should be lost in applying the avian tuberculin test to the rest and weeding out those which react. The avian tuberculin test is quite reliable when properly applied, but since tuberculosis may have a long period of incubation, a negative test is possible in slight incipient cases.

Control and Prevention.

No treatment of tuberculous fowls can be recommended; the diseased birds should be promptly slaughtered and, if the diagnosis is confirmed, the carcass burnt in a destructor, together with the droppings scraped off the boards and all litter.

If the farm is one where fowls and pigs (at intervals) are given a free run, the task is formidable, if some of the pigs have contracted avian tuberculosis.

The first measure is to detect the tuberculous pigs and deal with them as circumstances require. A thorough cleaning up of the pigstyes cannot be avoided. Concurrently, the diseased birds should be weeded out and the free run of the remaining non-reacting ones be stopped by penning them up on a fresh piece of ground, and testing them at intervals and watching them for any signs of incipient tuberculosis. The roosting places should be cleaned out and the fowls and pigs kept away from the yard for a year at least. If tuberculosis has occurred in fowls bred on an intensive system, then the disinfection of the houses and boards is relatively easy and follows the lines suggested in other infections.

H.—Fowl Pox and Fowl Diphtheria.

These two diseases are mentioned together, because, though they differ considerably in the appearance, yet they

have a common initial causation: an invisible and filtrable microbe.

Fowl-pox is due to the action of the "virus" alone on the epithelial cells of the dermis; fowl-diphtheria results from the localisation and multiplication of the same "virus" in the mucous membranes of the eyes and mouth and the subsequent invasion of the proliferating cells by various bacteria. In fowl-pox the numerous warty excrescences of the eyelids, comb or gills, under-surface of the wings, groin-fold, etc., dry up within a fortnight or even less and then fall off in scabs.

In fowl-diphtheria the tongue, roof of mouth, pharynx, get covered with a yellow, wash-leather-like exudate; one or both eyelids fill with a cheesy fœtid mass. Recovery is slow and mortality and disablement high.

Roup presents very similar symptoms, but is considered to be a bacterial disease, pure and simple. A nutritional roup has also been described, which is not transferable; this is due to deficiency in vitamin A. Beach (1930).

Symptomatic Individual Treatment.

Fowl-pox warts can be touched with a cotton-wool pellet soaked in tincture of iodine, so as to hasten their healing. In fowl diphtheria an attempt can be made to clean away the cheesy masses from the mouth and eyes by means of dry cottonwool or gauze pellets soaked in a weak antiseptic, such as one per cent. lysol solution. This process will have to be repeated and sometimes abscesses form under the eyes, requiring lancing. It will be matter for consideration whether such individualised treatment can repay the trouble taken.

Immunisation.

Favourable results are reported in relation to this method by T. M. Doyle (1930). It consists in the employment of a powdered pigeon-pox virus (*i.e.*, particularly virulent for pigeons, but nearly innocuous for fowls) collected between the 9-12th day and suspended in 80 per cent. glycerine solution in physiological saline. About a dozen feathers are plucked off the thigh of the fowl to be immunised and the solution is applied lightly with a brush. The follicles swell up about the fourth day and subside in five days more. Immunity lasts a year.

Control and Prevention.

Immunisation should not preclude an attempt to rid the premises of any source of infection, by separating out the diseased fowls and cleaning up the houses. The scabs which fall off the warts remain infectious for many months and indeed may give rise another year to an outbreak of fowl-diphtheria.

The spread of fowl-pox is much helped by overcrowding; in fowls on a free run I have seen the disease restricted to few birds. In common with other "viruses" that of fowl-pox will show a definite preference for certain strains of chickens or even individuals of a brood.

Fowl-Plague and Poultry-Plague.

These are extremely dangerous diseases, which frequently show a mortality of 100 per cent., as in the case of the outbreak described by Doyle (1927). The principal symptom in the acute disease was abundant salivation; when the infection followed a somewhat prolonged course, paralysis developed. Spontaneous recovery was not observed. The plague is due to an invisible and filtrable microbe.

There is at present no obligation to notify the outbreak of any poultry disease, but the veterinarian who suspects poultry-plague in any birds should obtain the help and advice of the Ministry of Agriculture, for the confirmation of the diagnosis and the application of preventive measures.

1.—Blood Diseases (Hæmopathies) and Tumours.

These apparently widely different morbid conditions are grouped together, because their common feature is the predominant proliferation and continuous increase of cells originating from definite histogenetic groups. Typical and early instances of hæmopathies and tumours clearly show this distinguishing trait, though later and terminal stages may be complicated by the accessory proliferation of other tissues.

From the standpoint of poultry hygiene and what one may call economic prevention, these diseases can be controlled in the same manner. There is no necessity to kill, destroy or bury fowls affected with any of the following:—

Hæmopathies:

1.—Secondary parasitic anæmias, caused by Dermanyssus or other mites, helminths or unsuitable feeding.

2.—Primary progressive anæmias of the erythromyelosis type, which are due to a morbid proliferation of the erythrocyte-forming sinusoids in the marrow.

3.—Leucocythæmias with a progressive increase of immature granulocytes in the circulation.

4.—Lymphocythæmias with a similar increase of cells of the lymphocyte series.

5.—Monocythæmias with the appearance of dividing monocytes in the circulation.

These typical conditions should not be associated with bacterial diseases. It may be stated, in a general manner, that whilst avian tuberculosis is a disease of fowls on a free run on a farm, these conditions are more frequently found in stock kept on an "intensive" principle.

Tumours.

6.—Tumour-like deposits in the liver and spleen (*N.B.*—When not due to tuberculosis) of any of the cells mentioned in 3-5.

7.—Benign tumours consisting of connective tissue elements, either single or multiple (fibromata, chondromata).

8.—Malignant tumours, *i.e.*, forming metastases from one primary centre.

9.—Lymphomatous diffuse hypertrophy, with a predilection for peri-neurotic localisation, which induces trophic paralysis.

These diseases are not infective in the commonly accepted meaning of the word; transmission under experimental conditions is by no means easy and then succeeds only in fowls of the same genus. The accumulated appearance of several cases of one or the other of these diseases is usually the outcome of close inbreeding accompanied by a frequent accessory stimulus, usually of a parasitic nature.

Control and Prevention.

The pathology of these diseases has been discussed elsewhere (*Journal of Comparative Pathology*, 1930), so that here only the simple measures should be alluded to which ought to suffice to reduce the number of any of these diseases appearing in poultry stock. The anæmic conditions by themselves cover a very wide etiological field,

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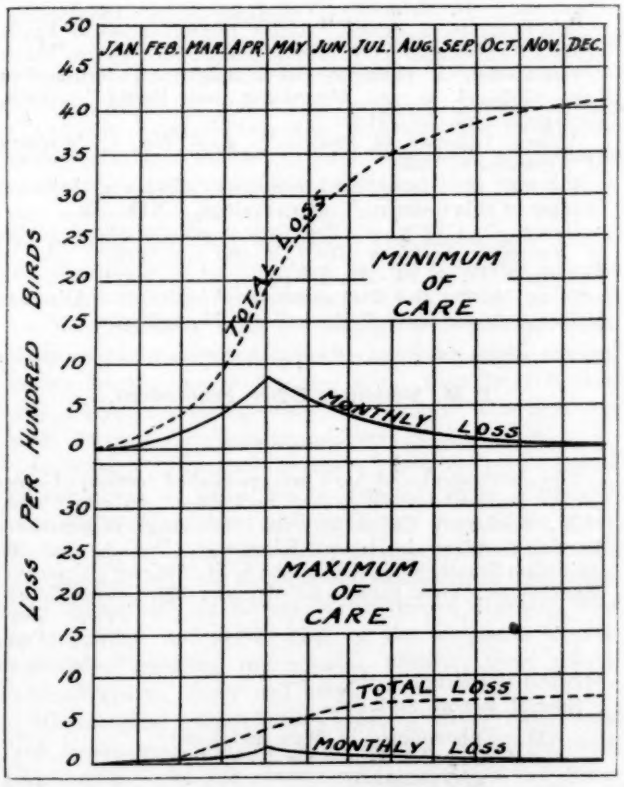
and therefore any obvious cause must first be attended to, such as low value food, mites, helminths, lack of ventilation, dirty housing. The diseased hens will probably not lay, but if they do one should avoid using the eggs for breeding purposes. Then the introduction of healthy new stock is to be recommended, in addition to improvement in any of the conditions which do not appear conducive to the good health and contentment of the laying hens. These various preventive precautions can be gradually carried out and there is no need for the prompt and sweeping clean-up which is absolutely necessary when dealing with coccidiosis or tubercle. The culling out and destruction of the diseased birds will not stop the incidence of any of these tumour-like ailments; instead, improvements dealing with the causes of the morbid conditions will avoid their yearly reappearance, which otherwise will gradually cause a very appreciable mortality and loss of condition and output in hundreds of birds in a large farm.

J.—Conclusions.

A large proportion of the poultry in this country being on a free run, and considerable numbers of the rest being kept on a semi-intensive principle, the application of sanitary precautions in any outbreak of parasitic disease will have to be suited to the particular circumstances of the case.

In some text books various methods for the avoidance of accumulation of parasitic diseases are recommended, such as the killing off of hens after two years for the avoidance of avian tuberculosis, the feeding of chicks with



Graph showing the effects of hygiene on the mortality of chicks. Test pens were maintained under farm conditions; in one no cleaning or sanitation was performed; in the other thoroughly clean and sanitary quarters were provided. At the end of the year, 42 per cent. of the chicks had died in the unsanitary pen, against 7 per cent. in the hygienic shed. From Bushnell and Brandly (1930).

boiled milk for other ailments and so on; none of these methods can promise a thorough cure and so they have been left unmentioned.

It will be seen that the underlying principles of all the measures recommended here are based on the provision of certain commonplace appliances and the application of simple sanitary measures.

1.—Diagnosis, isolation and treatment in separate pens; it is preferable that these should not be elaborate or permanent; old and converted packing cases, rough wicker work or anything else that can be burnt after use, are preferable.

2.—Change of run, digging up the infected run and sowing with mustard or coarse grass. Burning all litter and droppings.

3.—Creosoting and limewashing the buildings and appliances.

These are the general rules relative to acute and dangerous outbreaks; for the permanent hygienic and anti-parasitic action these points are to be remembered:—

That fowls, in proportion to their size, require much more ventilation than mammals. It has been experimentally shown that the number of cubic feet of air breathed every 24 hours per 1,000 lbs. live weight is:—

Cow, 2,804; Man, 2,833; Horse, 3,401;

but the figure for the hen is 8,278.

In addition, birds not having sweat glands, large amounts of moisture are given off in their breath. All this supports the contention that even in cold weather hens will suffer less from a low temperature than from lack of air through boarding up of every opening. For successful poultry keeping, from the standpoint of anti-parasitic measures, the proper care and upkeep of the building sheltering the hens is more important than the shape of the building itself. This leads on to the necessity of a daily clean-up of the dropping boards, frequent paraffining of the perches, where (and that is nearly everywhere) red mite are suspected, and creosoting and limewashing of the henhouses once a year, together with disposal of the droppings and litter. That the droppings are excellent fertiliser need not be repeated, but I have seen one farmer buy guano from overseas and throw away the droppings from the hen-house. The ashes from the destructor have a fertilising value.

Rotation or regular change of runs is to be recommended where the semi-intensive method is employed.

It may be objected that the trouble and expenditure involved in keeping a poultry-yard clean, or rotating the runs or creosoting the buildings once a year, is not worth the possible loss resulting from the unhindered infestation by parasites.

This is a specious argument, because the expenditure on such hygienic measures can be accurately estimated, but the constant, daily loss resulting through lowered egg-production, avoidable mortality of chicks, waste of food (and that notwithstanding inferior appearance of hens) passes unnoticed, but is certainly several times the expenditure of the labour involved in proper scientific poultry keeping. There is the added danger of a rapid spread of any imported disease like coccidiosis or tuberculosis, which may involve much larger sums, with the further assurance that, unless a thorough disinfection is put in hand, the mortality will continue.

The importance of the nutritional aspect of poultry production has not been forgotten or still less denied, especially where fowls are hatched on an intensive or industrialised system. But where chickens have the free run of a farm, they usually have access to a balanced ration and parasites are the main reason for unthrift and low egg output.

It has been seen that the accurate diagnosis and prevention of the parasitism in poultry requires the application of pathological science, and that therefore the study of poultry hygiene may well interest the progressive veterinarian, not only because of its practical prospects, but also because he will find reflected in avian pathology many problems which affect the well-being of other equally important agricultural stock.

* * *

The prolonged observation of the fowls whose ailments and hygiene form the basis of this communication, would not have been possible without the kind co-operation of Professor J. Basil Buxton, of the Institute of Animal Pathology of the University, Cambridge, who placed the facilities of the Field Laboratory at my disposal.

It is with great pleasure that I acknowledge his help and interest.

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The Prevalence of Fowl Paralysis in England.

By C. A. McGaughey, M.R.C.V.S., D.V.S.M.

Department of Bacteriology and Preventive Medicine, University of Manchester.

The object of this communication is to draw the attention of the veterinary profession to the prevalence of fowl paralysis in this country.

This disease was first observed in Austria in 1907 and has since been recorded in the United States of America, Holland and South Africa. Its existence in England was first mentioned by Galloway (1929). McGaughey and Downie (1930) recorded in detail the clinical and pathological features of the disease based on an extensive outbreak in Lancashire which appeared to have started in 1927. The importance of the disease to poultry breeders and the gravity of its existence in England from an economic point of view was pointed out. The opinion then expressed, that it was probably more widespread in this country than was realised, has since been confirmed. Since the original communication, six separate outbreaks have been confirmed by histological examination in this laboratory. It is highly desirable that members of the profession should be aware of the nature of the disease and the means of diagnosis, in order that its spread may be checked as far as possible.

The various features of the condition were fully described in an earlier communication (McGaughey and Downie, 1930).

Clinical Signs.—These may be briefly described as the appearance, in a number of birds in a flock, of gradually increasing weakness, usually associated with drooping of one or both wings, sometimes with torticollis, impaired locomotion, iritis and lethargy. The combs and wattles usually appear to be shrunken, but not noticeably anæmic or congested. The temperature remains normal and there are no exudations from the mouth or nasal passages. There is often arrest of maturity in young birds, causing severe interference with egg laying (usually cessation) and delayed spermatogenesis. A terminal diarrhœa or, more correctly, incontinence of fæces is often seen.

General Pathology.—In some cases, no gross lesions in any organ or tissue can be detected; more commonly, only slight enlargement of the posterior roots of the spinal nerves may be seen. Tumours, usually so small that they are detected only on *post-mortem* examination, but which may occasionally be several centimetres in diameter, may be found on the nerve roots or the peripheral nerves, sometimes involving the muscles, kidneys, liver, spleen, adrenal glands, ovary and lungs.

Microscopical examination of nerves, nerve roots, cord and brain from affected birds reveals infiltration with mononuclear cells and consequent degeneration and disappearance of many of the normal nerve cells and their axones. Nodules of mononuclear cells may be seen in sections of the liver, kidney, adrenals and other organs. Microscopic examination of the tumours shows dense collections of mononuclear cells, many of which show mitotic figures.

Ætiology.—Recent transmission experiments by Seifried (1930) would seem to support the conclusions of earlier observers, *viz.*, that the disease was caused by a virus. Seifried has succeeded in transmitting the disease through a series of four fowls and has also shown that the infective agent survives in 50 per cent. glycerol.

Method of Infection.—It seems probable that healthy birds may become infected from contaminated soil and houses as well as by contact with diseased birds. It has been pointed out that, once the disease has appeared on a farm, it tends to become endemic and to reappear year after year. There is also a certain amount of evidence that the disease may be transmitted through the egg. Doyle (1926) in the United States of America expressed this opinion and McGaughey and Downie (1930) mentioned that there was some evidence that the disease had spread from the outbreak reported to two fresh premises through eggs bought from the infected place.

In a recent outbreak in Cheshire, the disease has appeared only in Wyandotte pullets hatched from eggs which had been bought in Lancashire. The appearance of the disease in one particular breed was also noted in another recent outbreak in Cheshire, where it was confined to Leghorns only. The disease has been recorded in all breeds of fowls but has not yet been seen in other birds.

At present, there is no evidence to suggest that clinically-affected birds may recover, but as Pappenheimer, Dunn and Seidlin (1929) found microscopic lesions in the central nervous system of apparently normal birds, it is probable that many birds are affected but show no clinical signs.

Diagnosis.—Although the history and clinical signs may be suggestive of the disease, several affected birds should be killed and careful *post-mortem* examinations made. The brain, spinal cord and spinal nerves with their roots should be dissected out and examined both macroscopically and microscopically. If material is to be sent to a laboratory for histological examination, live birds should be sent if possible. If this is not possible, the brain and cord with its attached nerves should be exposed, the spinal column removed and the whole structure immersed in saline, containing 10 per cent. formalin, for 24 hours and then sent in one or several pieces. Tumours and organs showing lesions should be treated in the same way. It is advisable to make several *post-mortem* examinations, because some birds may show no gross lesions and also because occasional birds may show lesions of concomitant or secondary infections such as tuberculosis, aspergillosis, etc.,

Prevention.—Although no methods of prophylaxis have yet been devised, the following recommendations might be useful in preventing serious losses.

1. Diagnosis should be made as early as possible.
2. All affected birds should be destroyed as soon as they are detected.
3. Infected premises should be thoroughly disinfected.
4. An infected flock should not be used for breeding.
5. Poultry farmers should ensure that eggs bought for hatching, chicks, pullets and cockerels have come from flocks free from all suspicion of the disease.

6. As the disease usually appears first in young pullets from four to eight months old, it is advisable to isolate the older breeding pullets on uncontaminated ground and to take every precaution to prevent contact, direct or indirect, between the young birds and the older birds.

SUMMARY.

1. Seven separate outbreaks of fowl paralysis, apparently unconnected, have been confirmed in Lancashire and Cheshire within the past twelve months.

2. The mortality has ranged from 12 birds in a flock of 60 up to 800 birds in a flock of 3,000.

3. The losses suffered through interference with breeding and egg production have been severe. One outbreak is calculated to have caused the loss of £1,000, and another has forced the owner to abandon poultry-farming.

4. It is probable that many outbreaks of fowl paralysis are not detected but are diagnosed as tuberculosis, aspergillosis, infectious leukæmia, sporadic cases of which may be found in a flock infected with fowl paralysis.

5. The only certain method of diagnosis is histological examination of the tissues of several affected birds from a flock.

6. There is some evidence that the disease may be transmitted through the egg.

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Enrolment in American Veterinary Colleges.

The enrolment for the school year 1930-31 at eleven recognised veterinary schools in the United States and one in Canada shows an increase over that for 1929-30. The increase on the whole is not large, but is nevertheless material. Only one of the twelve schools, Washington State, shows a decrease in the total enrolment.

In all the schools, the gain in the first year classes is 63, and in the total enrolment is 133. Excluding special and graduate students the gain is 135 or nearly 13 per cent. Last year the gain over the preceding year was 130. —*Veterinary Medicine.*

Growing of Linseed.

Experiments are being carried out in Kincardineshire by the Aberdeen College with a view to discovering the possibilities of growing linseed to mix with grain as a food for farm stock. Results on several farms show that Argentine linseed is most suitable for seed production in the north-east. Baltic and English types gave a high yield of straw but a poor yield of seed. A seeding of 84 lb. per acre is recommended. The crop grown from Argentine seed showed no trace of lodging after having been manured with from three to four cwt. of grain manure per acre. Linseed when sown by the middle of April would be ready for harvesting before the grain crops. A more extended growth of linseed, peas, beans, and other leguminous crops would result in a curtailment in the bill for concentrated foods for stock.

The Veterinary Record.
DECEMBER 13TH, 1930.

The Growing Importance to the Veterinarian of the Diseases of Poultry.

The astounding figures recently given in Parliament by the Minister of Agriculture, showing that the importation of eggs into Great Britain reached the immense total in value of £17,855,625, in addition to the sum of £1,204,725 represented by the value of live poultry imported, during the twelve months preceding his announcement, will have brought to many of our readers a revelation of the immense possibilities of veterinary practice amongst poultry in this country. In the United States, it is well for us to remember in this connection, the poultry industry, as it is now termed, has attained third place amongst the activities of the farming community, being superior to the value of cattle and sheep.

It was with these important facts in mind that we approached Dr. Bayon, of the Molteno Institute, in the hope that he would enable us to give our readers the benefit of some of the results of his researches into the bacterial and parasitic ailments of poultry, and we are glad to have the opportunity of presenting, in this issue, a valuable contribution from his pen, dealing with the matter from the hygienic point of view. Many textbooks and leaflets concerning poultry pathology exist, but in Dr. Bayon's contribution—and herein lies its great value—suggestions are made from the practical standpoint and on the basis of actual experience.

The day is now past when the veterinarian, faced as he is with changing conditions of practice consequent upon the serious reduction in numbers of the horse, can afford to ignore the needs of this growing industry, which has already called science to its aid, with beneficial results to those concerned. By advising the relatively simple hygienic measures which are required to control and destroy the parasites of poultry, veterinarians can place their knowledge at the service of the farming community and further the prosperity of an important branch of agriculture, in which very considerable sums of money are invested and which could be profitably increased. Biologists never cease to marvel at the wonderful efficiency of the humble hen as a machine, converting food

so rapidly into calcareous substances and complex albuminoid bodies. It has been said in textbooks that Great Britain cannot supply more than part of the demand for the products of this wonderful machine, owing to its unfavourable climate, the inference being that the importation is from countries like Italy or the South of France. Against this stands the statistical fact that Denmark, the Irish Free State, the Netherlands, Belgium and Poland are the largest exporters of eggs to this country, in the order stated. The mention of Belgium in this connection reminds us that it is possible to increase the poultry production of a country by suitable measures, since Belgium, which for some years after the War was a heavy importer of poultry products, has now become a large exporter of eggs. The same can be said of South Africa, which now occupies a prominent position as an exporter of eggs.

There are certain broad principles which the practitioner would do well to follow when he is called upon to advise the poultry farmer client. It will be well for him to have in mind, for instance, that the individual treatment of fowls suffering from bacterial diseases is not advisable; even when life is prolonged, the birds are weak, inferior in appearance and output and may develop a chronic " carrier " condition, thus continuing and spreading the very disease it is wished to avoid. When dealing with bacterially-infected poultry, hygiene and preventive medicine can be relied upon to provide a lasting cure which can be recommended in every instance.

Bacterial diseases, like bacillary white diarrhœa, may cause a sweeping mortality among chicks; but, in addition, it is common knowledge that numerous parasitic ailments can be detected in poultry all over the country; indeed, such morbid conditions are so frequent as to pass practically unnoticed, so that their damaging effect, or even their existence, is denied. Nevertheless, the deleterious results of parasitism, because constant and widely spread, are economically important; moreover, these various parasitic infestations differ from bacterial or certain protozoal diseases, in so far that they do repay individual treatment. What one may call the " Slaughter Policy " is clearly indicated to the detriment of the parasites, and not, as at times advised, in relation to the host-bird.

Many so-called vicious habits of poultry are the direct outcome of parasitic infestation, *e.g.*, feather-plucking, frequently brought on by the irritation caused by the mite *Cnemidocoptes levis* var. *gallinae*. Away-laying is another; it will be found that often the usual nest is subject to the attack of fleas, red mites and similar vermin.

The difference which exists in appearance and output between a parasitized (helminths and mites) poultry stock and one which is hygienically kept must be seen to be believed.

The important part played by the fowl in the dissemination of avian tuberculosis to swine has been demonstrated by Cornell, Griffith and many others; this is an additional reason for the veterinarian to trace the disease to its source and prevent the added loss through preventable causes in pig breeding.

In conclusion, we would emphasise the necessity for a realization on the part of the community in general and the veterinarian in particular that poultry-keeping is no longer merely to be regarded as a hobby for any citizen with a back-yard, or as an unimportant side-line for the farmer, but as a serious, scientific study, and one demanding the full knowledge of the veterinarian in regard to the nutritional, parasitic and other ailments of this valuable and interesting stock.

Undulant Fever.

The Public Health Report of the United States Public Health Service for October 10th contains a special article on undulant fever, with references to the following features: historical, etiology, bacteriology, immunology, *Brucella abortus* infection in animals, and epidemiology. There are numerous illustrations of the lesions observed in the spleens and livers of animals infected with different strains of *Br. melitensis* and *abortus*.

Reindeer Meat Possibilities.

The suggestion that there is in the breeding of reindeer herds the possibility of a vast meat industry in the Far North of Canada, is made in a recently published book by Mr. Robert Stokes. The idea, it is claimed, has much to support it in the practical experience of Alaska. Herds totalling millions of reindeer have been developed there, enabling the meat of this animal to be placed on many American tables, and people in the United States have acquired a taste for it. The area available for breeding herds in the Far North of Canada is far greater than in Alaska.

According to Huddleston and Johnston, the rash or erythema that occurs on the skin of the arms of some veterinarians after vaginal and uterine examination of cows is an indication of a hypersensitiveness to the *B. abortus*. This rash may occur within 15 or 20 minutes and may persist for several days. — Vet. Med

Eleventh International Veterinary Congress, London,

August, 1930.

Abridged Papers.

(*Continued from page* 1114.)

Infectious Abortion of Cattle, Sheep and Swine in the United States.

By Dr. W. E. Cotton.
Superintendent of Experimental Station, Bureau of Animal Industry, U.S. Department of Agriculture, Bethesda, Md.

This paper calls attention to the serious import of infectious abortion for the dairying and cattle raising industries. It is probably the greatest cattle plague in the United States, causing a loss which has been estimated at 50 million dollars per annum. Increased interest is being shown in its control, and a number of States have laws requiring incoming breeding cattle to be negative to the blood test. The shortcomings of the agglutination test as a method of diagnosis are pointed out, and suggestions made for its better interpretation and improvement.

The author discusses methods of control and eradication, including segregation, sanitation and vaccination, and their practicability in various types of herds. Mention is made of the great discrepancy in commercial vaccines. One was found to contain a porcine strain, which was intended for use on cattle. Many investigators hold that the use of vaccines is dangerous and objectionable, and an experiment is quoted which indicates that cows vaccinated during lactation are unsafe animals to add to clean herds.

Mention is made of the use of a vaccine made from an avirulent strain of *B. abortus*. Porcine strains have also been used but, while sometimes effective, they cannot be used in vaccines because of the risk of creating carriers and eliminators of a strain which is believed to be more pathogenic for man. The author is of the opinion that vaccines probably have a limited place in abortion control, but production and distribution require rigid supervision.

New routes of infection have been recognised, such as through the eye and skin. It is recommended that further study should be given to ascertain the importance of these channels of infection. Further, the relation of swine abortion to that of the bovine species stands in need of definition. The present view is that these two varieties are not intercommunicable by natural means, although they are by inoculation.

The question of human infection with *B. abortus* is of great interest, since so many people are exposed to it daily. Evidence against the cow is circumstantial, but it is now useless to cling to the belief that the milk is innocent. Concluding, the author states that it is too early by far to predict the significance of *B. abortus* to human health. From an examination of 96 strains from cows, Huddleston obtained the porcine strain eight times and melitensis strains twice. The sources of human infection might find an explanation here and this problem in relation to human health deserves further study.

W. L. S.

Infectious Abortion of Cattle, Sheep and Swine.

By Professor Halfdan Holth.
Director, Veterinaer Institutet, Oslo.

Prior to restricting his theme to *Bacillus abortus* Bang infections, the author draws attention to the relatively large number of cases of abortion which he found were not due to specific abortion bacilli. Thus from 1912-1929 he tested material from 16,743 cows which had aborted, and only 28·72 per cent. of that number reacted more or less distinctly.

A short morphological account of the bacillus is given, followed by a simple method for obtaining the organism in pure culture. Although the bacillus has quite considerable powers of resistance under favourable conditions, the author believes that a cowhouse properly cleansed out and left exposed to air and sunlight throughout the summer, will then be free of infection.

The occurrence of abortion bacilli in cattle is discussed, and mention is made of the frequency of its presence in milk. Samples of milk from 13 infected cows, all showing a distinct blood reaction, were examined, and nine gave a positive result. Again, of 35 milk samples examined from positively reacting cows, only four gave a positive finding of bacilli; and in another herd of 65, 35 were shown to have bacilli in their milk. The udder alone may become infected, but the milk supply of Oslo is comparatively free of abortion bacilli, on account of the mixing of supplies. Thus, out of 106 samples of shop milk examined from Oslo, only one was found to contain abortion bacilli. The author refers to the infection in bulls and in swine, and states that in Europe infectious abortion among swine appears to be of less frequent occurrence than in America. Among sheep, goats and horses the infection is exceptional. Guinea-pigs are highly susceptible and when infected with abortion bacilli are very sensitive to the action of tuberculin.

The author recommends both the agglutination and complement fixation tests and considers them reliable for diagnosis. During a period of 17 years nearly 40,000 blood samples have been examined, of which 23·76 per cent. showed immune substances. A description is given of a new method for finding abortion bacilli in milk, but more endeavours should be made to find a simpler technique for demonstrating the bacilli.

Discussing the campaign against infection, the author states that interest in its prevention in Norway is increasing. Systematic blood testing is recommended and the reactors should be separated from the healthy. If the chronic bacilli excretors are detected and disposed of, strict isolation is not essential. Reference to vaccination.

With regard to the use of vaccines consisting of killed abortion bacilli, the author points out that by producing immune substances, they destroy the information afforded by the blood test. He is against the use of living vaccines.

W. L. S.

The stimulating effect of meat might be judged from the fact that in the past buccaneers had derived their name from the large quantities of "bucca," or concentrated ment, which they ate.—*Sir Arbuthnot Lane*.

Contagious Abortion in the Cow, Sheep and Pig.

By Professor Dr. W. Zwick.
Direktor des Veterinärhygienisden und Tierseuchen-Instituts der Landes-Universitat Giessen, Giessen, Germany.

The author points out that he was a reporter on this subject to the Tenth International Congress, and that he has avoided repetition of what he said in his previous report, or has condensed it. The aim of the present report is to show how matters stand in Germany at the present time.

The fact that contagious bovine abortion is selected, along with foot-and-mouth disease and tuberculosis, for discussion at a general meeting of the Eleventh International Congress is a clear indication of the extreme importance of the disease from the scientific and agricultural points of view, and of combining to achieve its suppression.

Professor Zwick estimates that in Germany the disease is responsible for an annual loss amounting to 250 million Reichsmarks. The loss in America is, according to Mohler, 50 million dollars. The losses include loss of calves, injury to the health of the cows, disturbance of function of the genital organs, reduction in milk yield, reduction in value of the animals, and losses in calves owing to decreased resistance and feeble development.

The disease is widespread, and its spread is increasing, the infection is readily carried from place to place, and is extremely difficult to eradicate.

A.—Contagious Bovine Abortion.

Since the last report there is nothing new regarding the causation of the condition. The *Bacillus abortus* Bang is the principal cause, other bacteria and possibly some protozoa are only occasional causes.

The investigations of Jensen and of Smith show clearly that cases of contagious abortion occur, the causation of which has not yet been cleared up.

It is of the utmost importance that in every case of abortion everything possible should be done to ascertain the cause, and every case should be considered infectious until the opposite is clearly established. Zwick holds that the agglutination test alone is not reliable for the diagnosis of the disease, and that to increase the certainty of diagnosis both the agglutination test and the complement fixation test should be applied. As is well known, the serological tests only furnish evidence as to the existence of infection, but no information as to whether abortion will occur. Reacting animals may calve normally and in some cases positive reactions to serum tests are obtained only when a few weeks have elapsed since the abortion actually occurred.

Apart from serological tests, a diagnosis of contagious abortion can be based upon (1) the lesions of the placenta; (2) the demonstration, either by microscopic examination or by culture, of the bacillus in the fœtus or its membranes; (3) the so-called "placenta reaction," and (4) guinea-pig experiments.

The last of these would seem, from experience, to be the most certain method of diagnosis in doubtful cases, but it is not unfallible.

Natural Infection.

The infection is spread through the medium of the uterine discharge, the fœtus and its membranes, the milk, the generative organs of infected male animals, and the fæces of new-born calves of infected cows. Intermediary carriers, such as clothing, etc., also play a part in disseminating infective material.

There can be no doubt that the commonest path of infection is by way of the alimentary tract, and the part played by infected bulls is still in dispute. While this cannot be considered as a frequent means of spreading the disease, it must be admitted that it may occur, and in any attempt to control the disease this possibility must not be overlooked.

The most frequent manner in which the disease is introduced into a clean herd is through purchase of an animal that is in a condition of latent infection.

The author states that cows which give negative results to serological tests, and which have not calved, and have previously calved normally, may excrete abortion bacilli. Cows excreting the bacillus can be discovered in herds where cases of abortion have not occurred.

The abortion bacillus finds conditions favourable for its multiplication in the pregnant uterus, while it disappears from the empty uterus within a month after abortion. Very frequently it invades the udder and causes a persistent infection of that organ without inducing any recognisable changes in the organ. Re-infection of the uterus may take place from the infected udder.

There is no evidence to show that calves taking infected milk acquire infection or immunity.

Zwick believes that the cases of calf diarrhœa which occur on infected premises are due to the abortion bacillus, and that anti-abortion serum is valuable for protective and curative purposes.

The Control of Contagious Abortion.

i. By hygienic measures.

Certain steps can be taken to assist in the control of contagious abortion on hygienic lines. These include the provision of separate calving boxes, careful disinfection of the standings, safe disposal of the fœtus and membranes, disinfection of aborted animals before they are returned to their stalls.

The access of the disease into a herd can largely be checked by making it self supporting as regards the introduction of new animals or by purchasing only from abortion-free herds, by isolation of all new purchases until freedom from infection has been established, and by allowing bulls from infection-free herds to cover non-infected cows only.

In cases where infection has only recently been introduced, and the infection rate is low, rigid application of tests and hygienic measures makes it possible to eliminate the disease, but it has to be admitted that success is not invariably achieved. Zwick quotes figures published by Axel regarding the results obtained in 100 farms comprising 1,242 milch cows. By testing and the exercise of precautionary measures the disease was eliminated from about one-third of the farms. But it is acknowledged that in practice the strict application of hygienic measures is very often impossible.

ii. Inoculation.

Since infected cows for the most part calve normally

after they have once aborted, the aim of protective inoculation is to produce an active immunity. Living cultures and dead cultures have been used by a number of investigators for this purpose since the original experiments of Bang and Stribolt in 1903-06.

Zwick refers to the complicated nature of the problem in vaccinating against abortion. Abortion may occur either as a result of the production of extensive lesions of the fœtal membranes or as a result of the death of the fœtus, that death having been caused by the abortion bacillus. Protective inoculation must be effective against both of these.

The value of any method can only be accurately gauged when the results obtained over a period of years are taken into consideration and are compared with the results in a similar number of unvaccinated animals under similar conditions.

Statistics of a number of authors regarding the results obtained with vaccines are quoted, and, although there is some opinion to the contrary, in general it appears that inoculation with living culture in proper circumstances does result in a very marked reduction in the number of abortions occurring.

It is admitted that the methods of protective inoculation available up to the present are not completely satisfactory. Experiments are being carried out in Germany with a view to effecting improvement. It has been suggested that vaccination with live organisms should be carried out during the early part of the period of pregnancy, on the grounds that at this stage the fœtal and maternal placentas are not sufficiently developed to allow of there being much risk of a multiplication of the organisms, and that the immunity will gradually increase until it is high at the seventh to ninth months of pregnancy, when it is most required.

On the other hand, it has been suggested that vaccination should be postponed until near the end of pregnancy, on the grounds that the production of immunity is more rapid when an animal is heavy in calf, and that there is not sufficient time for disease of the membranes to develop to the extent necessary to cause abortion to take place.

The whole problem is one which requires more investigation, but close co-operation between practitioners and laboratories is absolutely essential if reliable figures are to be obtained upon which a judgment can be based. Zwick refers to the publication in the *Deutsche Tierärzliche Wochenscrift*, 1928, p. 140, of directions compiled by a Commission for the Control of Contagious Abortion. An International Commission has recently been set up for the investigation of certain animal plagues, including tuberculosis and foot-and-mouth disease. Zwick holds that contagious abortion merits the concern of this Commission.

No success has yet been achieved in the medicinal treatment of contagious abortion. The author discusses the question whether contagious abortion should be included in the scheduled diseases, and comes to the conclusion that such a course is not practicable.

B.—Contagious Abortion in Sheep.

A number of organisms have been indentified as causing contagious abortion in sheep: Bang's bacillus, bipolar organisms, spirilla, and bacteria of the paratyphoid group.

In England the disease caused by the spirillum (*Vibrio fœtus*) appears to be the most common.

In Germany *Bacterium abortus ovis* (paratyphoid group) is by far the most important cause of the disease. Witte and Karsten have shown that decaying or mouldy foodstuffs may cause abortion in sheep.

The control of the oubreaks of abortion in sheep caused by *B. abortus* and *V. fœtus* runs parallel with the control of contagious bovine abortion.

C.—Contagious Abortion in Pigs.

Little investigation has been carried out in Germany regarding abortion in pigs, but investigators in various parts of the world have identified *B. abortus* as the cause.

Abortion generally occurs between the 6th and 8th and the 12th and 16th weeks, and the sows may show anorexia and diarrhœa.

In Huddleson's view infected cow's milk is not the usual vehicle of infection for sows, and Fritsche and Berger are of the opinion that the boar plays an important part in the spread of the disease. Abortion bacilli of bovine origin appear to be only feebly pathogenic or non-pathogenic for pigs when given *per os*.

Strains of *B. abortus* isolated from pigs are of higher virulence for guinea-pigs than bovine strains, and the view has been expressed in America that they are also more virulent for man.

Infection in Man with Bang's Bacillus.

The author makes only a brief reference to this. Up to the present, no evidence is forthcoming that abortion in the human subject is caused by *B. abortus*. Cases are not rare in veterinary surgeons. Generally speaking, the disease in man runs a benign but rather prolonged course. The main symptoms are intermittent fever, neuralgic pains, enlargement of the spleen and liver, orchitis and osteomyelitis.

Apart from those whose duties bring them into close contact with infected cows, the cases generally result, it would seem, from the ingestion of raw milk. Heating to 65° C. for half-an-hour renders the milk safe as far as this organism is concerned.

The available evidence does not indicate that Bang's bacillus is a very important organism so far as human health is concerned. A. L. S.

Infectious Abortion (Bang) in Swine.

By Professor A. Uranov and Professor B. Bohl.
National Institute for Experimental Veterinary Medicine, Moscow.

The sepsis of abortion observed in large breeds of pigs, such as English breeds, in two districts in Northern Caucasus in 1929, was caused by bacilli.

Bang's bacillus was obtained in culture from the stomach contents of aborted fœtuses in one case, and in three directly from the uterine horns. In five other cases, in which bacteriological examination of the genital organs of the sows was undertaken, Bang's bacillus could not be detected. The bacillus isolated was pathogenic for guinea-pigs.

The blood-serum of all aborting and barren sows, as well as of some of the boars, agglutinated both porcine and bovine strains of the bacillus equally in dilutions up to 1 in 1,500.

It may be concluded that sterility in a considerable number of sows, and that the paralysis of the hind legs of a few sows and boars which were observed in these districts, are in at least some of the cases which we investigated to be attributed to infection with Bang's bacillus.

In the majority of cases, sows which had become infected with contagious abortion developed serious illness within two or three weeks and then recovered rapidly. The capacity of their sera to agglutinate Bang's bacillus completely cleared up the suspected nature of those cases.

The following conditions were found in the genital organs of pigs slaughtered, on account of infection with abortion or sterility, by *post-mortem* and histological exaimnation :—

Catarrh of the mucous membrane of the vagina, uterus, and Fallopian tubes. In two instances a purulent catarrhal exudate was found. The vaginal folds and the uterine glands showed centres composed of necrotic detritus. The individual uterine glands were distended to form cysts with serous contents.

In the majority of cases sclerosis of the uterine vessels and ligaments and a certain degree of toughness of the mucous membrane were observed. The ovaries showed a marked reduction in the ova, slight fibrosis of the capsule, and cystic distention of the follicles, which contained serous fluid, colloid and blood as a result of hæmorrhages into the ovary.

Coursing of Hares in Northern Ireland.

Before the prorogation of the Parliament of Northern Ireland, the Minister of Home Affairs (Sir Dawson Bates), replying to the Rev. Professor Corkey, said that his attention had been drawn to correspondence and discussion which had taken place in Northern Ireland regarding the coursing of live captive hares, and the whole subject was receiving the careful consideration of the Government. As the law now stood, under certain conditions the coursing and hunting of hares and other animals were exempt from the provisions of the Cruelty to Animals Acts, and the question whether these exemptions should be removed was one which involved consideration not only of the coursing of hares, but also the hunting of animals generally. It would not be possible to make any definite statement on the matter at present.

Avian tuberculosis is a relatively common disease in many sections of the United States. Five and one-half per cent. of 850,000 fowls tested in 1928 on 6,127 farms in 33 counties of Illinois were found to be tuberculous. Approximately 45 per cent. of the flocks tested were infected. Over 75 per cent. of the diseased birds were over one year of age. Swine are susceptible to avian tubercle bacilli and the widespread prevalence of avian tuberculosis among chickens accounts for the prevalence of tuberculosis in swine.—Cir. 354 Illinois.

Recent investigations tend to prove that there is a close relationship of certain poultry diseases to the lack of certain elements in food. A disease so closely resembling contagious roup that it is impossible, except by laboratory tests, to differentiate the two, is clearly shown to be due to lack of vitamin A. This is an essential food element contained in yellow corn, milk, leafy vegetables, and cod-liver oil.—Charles Murray, in *Successful Farming*.

Brucella abortus has been isolated 78 times from the stools of six human patients and once from bile procured by duodenal drainage. This organism was also isolated from the contents of the gall bladder. Thus it is evident that these microbes may pass through the digestive tract of man and may be a factor in disturbances of the gall bladder.—*Jour. A. M. A.*

Clinical and Case Reports.

Latent Effects of Strongylosis in the Horse.

By F. C. Scott, M.R.C.V.S., Pontefract.

At the present time one hears very little of the frequency of occurrence of aneurism, and embolism following, caused by the *Strongylus armatus*. Much is said concerning, and considerable endeavour is made to deal with, the parasite in the bowel lumen, but little recognition seems to be given to its effects in the arteries. Those effects are well described as to their pathology but, from a clinical point of view, they must often pass unrecognized, or be of such infrequent occurrence as to warrant the small amount of attention they receive in current literature.

Over a period of time, but particularly during the last twelve months, my attention has been forcibly drawn to these effects on account of their very frequent occurrence. I have found a certain train of symptoms in colic cases to be almost characteristic of embolism due to this parasite and, briefly described, it is as follows :—

Horses of any age may be affected. In the early stages the pains are subacute; usually there is no noticeable tympany at the flanks, there are regular bowel sounds and at this stage one is inclined to diagnose spasmodic colic due to "wind" and to expect a favourable outcome. When the patient is seen 12 to 24 hours later, it is apparent that collapse is taking place. In most cases the eye is injected, but in a minority no change is noted; the pulse is rapid and feeble and one realises that a profound alteration has taken place in the circulation; the condition of the abdomen does not permit of one assuming that strangulation has occurred by bowel torsion, and one has to assume that embolism is the cause. The horse at this stage often gives the owner the impression that relief has taken place, as he will stand for long periods without crouching and will whinney if a bucket be rattled; but on closer examination the ears are noticed to be held in a set position, there is oscillation of the eyeball, the horse is blind and probably the saliva is chewed to a sticky foam in the mouth. Soon the horse staggers and, after one or two recoveries, rigors set in and death follows. On *post-mortem* examination the aneurism is readily found, as is also a more or less extensive piece of bowel showing a condition in its mucous membrane varying from a slight venous congestion to necrosis. The actual embolus is difficult and at times impossible to find. In one case, in a 15-year-old mare, rupture of the affected portion of bowel had occurred with early death.

In another case, in a six-year-old horse, there was a history of violent exertion four hours prior to pains commencing and, on *post-mortem*, the intima of the artery showed calcareous deposits and the lymphatic glands were gritty from the same cause. Many cases of death following colic have been traced to this cause during this year; in fact, it has been responsible for more than all other causes added together, in my practice.

One sees other cases, however, without abdominal pain where rapid collapse and an injected eye are the outstanding sypmtoms; this applies to young horses. *Post-mortem* here again reveals aneurism. Debility and wasting

have not necessarily occurred in these cases, as horses three or fours years old, in semi-show condition, have been affected.

Cases of debility in young horses, with filling of the hind limbs and weakness, have revealed aneurism on *post-mortem* examination.

A case of a farcy leg in which, at the time, the tension was so great as to cause necrosis, and call for destruction, revealed verminous aneurism on *post-mortem* examination.

Two cases are alive to-day, each of which has always been unthrifty: the history in each case is similar; each one is the only one to survive out of a batch of young horses affected with strongylosis seven years ago. One can fairly assume here that, even now, only a partial circulation to the bowels is taking place. They are both ear-marked for *post-mortem* examination in the event of death from other causes.

The condition was suspected in both of these animals before the history was elicited.

Whilst admitting that aneurism is a common *post-mortem* finding in horses in apparent health, one can but assume that many unthrifty horses have this condition and are receiving only a partial digestive circulation.

One point on this subject which is not clear to me is the possibility of activity of the embryos in the thrombus; although calcification was noted in one case recorded, the twenty parasites counted present were still embryos.

Perhaps a correspondent who has specialised on this subject could inform me whether these embryos are incapable of further development in that situation and live on indefinitely as embryos.

It is more than likely that the two cases recorded as being affected for seven years will show embryos in the thrombi on *post-mortem* examination.

Tetany in Puppies.

By Frank Chambers, F.R.C.V.S., Wolverhampton.

In the *Veterinary Record* of March 23rd, 1929, Mr. W. P. Blount described a case of parathyroid deficiency, in a Cocker spaniel puppy, that resulted in tetany. This particular case made a wonderful recovery and grew into a fine dog, only to be fatally injured by a car when ten months old.

In August of this year, a rough-haired fox terrier male pup, three months old, was brought to me showing typical parathyroid-priva tetany. I prescribed tablets of parathyroid and calcium lactate and suggested a diet rich in vitamin D. The same week another rough-haired terrier pup was brought in for treatment showing the same symptoms. On making enquiries it transpired that these two puppies were from the same litter. They had been taken from the mother at six weeks old and sold to different people. Strangely enough, a third puppy from this litter was sent in for treatment, two weeks later, exhibiting very distinct symptoms of parathyroid-priva tetany *i.e.*, arched back, head depressed and moving up and down like a toy dog. The legs were slightly bowed and the gait was a staggering one; in fact, a general picture of rickets accompanied by tetanic convulsions, especially of the head and neck. The last puppy's recovery was hastened by several exposures to the mercury vapor lamp.

On the Treatment of Lambing Sickness or Milk Fever of Ewes by Calcium Chloride.

By B. Sjollema.

Laboratory for Medical Veterinary Chemistry, University of Utrecht, Holland.

In a short paper published in No. 30 (July 26th) of this journal I wrote about the experience which Mr. Noordijk, a Dutch veterinary surgeon, had by treating ewes suffering from this disease with calcium chloride.

I revert here to this subject to repair an omission, *i.e.*, to mention the number of ewes Mr. Noordijk treated during last spring with this salt.

Mr. Noordijk applied the injection of calcium chloride (combined with glucose), in the way already described by me, during last spring to 40 ewes.

Of these, 34 recovered within a few minutes; two of these 34 animals showed relapse. Both animals with relapse recovered within a few minutes after the second injection of calcium chloride. Six animals died after the treatment. In some of these cases the veterinarian was called in too late and the injection had no effect whatever. In other cases there was a direct recovery—the animals ran towards their lambs—but during the night the animals died, probably after new attacks. In one case the animal died directly after the injection was made.

Three of these ewes suffered from what is called the "fetch up illness."

The therapy was started only on April 3rd; therefore, nearly all treated ewes were with lamb at foot.

Prolonged Gestation in a Cow.

By W. W. Goldsmith, M.R.C.V.S., Hitchin.

On November 12th I was called to a calving case. I found the cow to be a second calf, pedigree Guernsey. She was unable to get up. On examining her, I found both forelegs, as far as the knees, in the passage. The head was turned back, bottom jaw upwards. After much trouble the head was brought into position: I remarked to the herdsman that it was an enormous head, and he then told me that the cow was due to calf on October 16th. She had showed no signs of calving till the morning of November 12th. The calf was still alive.

When I examined the cow, I had to remove a leg to get the shoulders through the pelvis and afterwards to remove the liver, stomach and intestines. By this means the calf was delivered as far as its hips. After rotating the calf, it was taken away.

The cow did well for 48 hours and then died suddenly.

The calf was left in the open till the following morning, and I then had it weighed. Without the stomach, liver and intestines, it weighed 140 lbs.; it was a heifer calf. I think this must be pretty nearly a record for a Guernsey—moreover, she was not a big cow of her breed.

The interesting points to me in this case are that the calf was carried 27 days over time and the immense growth it made in that time.

Review.

["**Handbook for Veterinary Surgeons.**" By Fred Bullock, ll.d., Barrister-at-Law. Second Edition. Baillière, Tindall & Cox, 7 & 8, Henrietta Street, London, W.C.2. Obtainable also from the Author at 10, Red Lion Square, London, W.C.1. Price 5s. 4d. post free.]

The second edition of Dr. Bullock's "Handbook for Veterinary Surgeons," first published in 1927, has just appeared.

It will be found to contain just double the amount of reading matter of the former edition. There has been a re-arrangement of the subject matter, indicated in the index, by removing the sub-section entitled Professional Conduct in chapter II, consisting of three pages in the first edition, and devoting the whole of chapter III to this important aspect of a veterinary surgeon's life.

Much of the useful advice given to commencing practitioners in chapter III of the first edition is incorporated in the re-named corresponding chapter of the new issue, with certain additions and details which will enhance the usefulness of the chapter.

Chapter IV has been enlarged by a comprehensive exposition of the legal responsibilities of veterinary surgeons. Whereas a single page was devoted to the law of negligence in the first edition, twelve pages of valuable information on this subject are given in the second. To practising veterinary surgeons this section alone will be found sufficient justification for the modest outlay, for nowhere can the like information be obtained in such a compact and understandable form.

The remainder of the edition contains information regarding post-graduate study and degrees, Government service, taxation, and other matters, reprinted, with additional details, from the first edition, and brought up to date. The enlarged notes on income tax and insurance will bring light in the darkness to many a harassed practitioner.

The new edition has been produced by Messrs. Baillière, Tindall, & Cox, and is bound in strong boards.

It is with more than ordinary confidence that this work can be recommended. To the newly-qualified veterinary surgeon it supplies just the information and advice that he most needs, and a careful study of it will enable him to avoid many pitfalls, and if the precepts contained are followed out, the standing of the veterinary profession must be distinctly raised. Nor will the more experienced practitioner fail to find it helpful, for the information compiled by Dr. Bullock is such as has never been completely furnished by the teaching schools; in fact, in the past it was not even mentioned.

The thanks of the veterinary profession are due to Dr. Bullock for supplying the deficiency.

A. C. D.

Mr. J. M'G. Petrie, in a demonstration to students at Clury, gave a warning to Aberdeen-Angus breeders that the breed is suffering from tucked-up, contracted flanks, a fault that overseas men have been quick to point out. Old breeders, he remarked, considered that the best animals had a white underline.

Translation.

Diagnosis of Caseous Lymphadenitis by the Intradermal-Reaction Test, after using Preisznocardine.

By E. Cesari, Institut Pasteur, Paris.

Extract from the "Bulletin de l'Académie Vétérinaire de France." T. III, 1930, No. 6.

Having been led, in the course of work undertaken on the experimental infection of guinea-pigs by Preisz-Nocard bacilli, to inject liquid filtration of old cultures of the bacilli into subjects previously inoculated with virulent bacilli, subjects in which the infection was in full activity, I observed that those guinea-pigs showed signs of a state of hypersensibility characterised by the usual reactional phenomena. I therefore propose to show here very briefly the experimental facts recorded in some rapid attempts carried out to study this particular point, though they are only connected as a side issue with the main objects of my researches.

The first observation that I made on the subject was in connection with a guinea-pig which had received on May 14th, in the pad of the right hind foot, about ¼ milligramme of living bacilli obtained from a culture of Preisz-Nocard bacilli cultured on slope gelatine 24 hours old. I have previously had occasion to state, at the last meeting, that I am using a stock of Preisz-Nocard bacilli isolated from a caseous popliteal lymph gland taken from a leg of imported frozen mutton, a specimen which is endowed with marked virulence and toxic powers. Following this virulent inoculation, the guinea-pig used in the experiment presented a series of symptoms evidenced by an enormous swelling of the foot which, in 24 hours, became red, swollen and very painful; then there appeared centres of abscesses accompanied by ulcerated patches more or less spread out, and in the following weeks considerable hypertrophy of the corresponding popliteal and inguinal lymph glands, which attained the size of a pea or a nut, and gradually became transformed into a pocket containing pus, in which there were found the specific bacilli.

On May 27th, that is to say, thirteen days after the virulent injection, this guinea-pig received into the muscles of the left thigh 2 c.c. of the liquid filtration, passed through a Berkefeld filter, of a mixture of the cultures of the Preisz-Nocard bacilli in Martin's broth, which had been kept in the incubator from one to four weeks at a temperature of 37° C. This medium contained the specific toxin of the bacilli of Preisz-Nocard, and the autolysed microbic products, the latter representing the really active substance which set up the phenomenon of hypersensibility. I propose to give the name "Preisznocardine" to this liquid of filtration of the old cultures.

Some minutes after the injection of the liquid the animal showed convulsive movements which constituted the first manifestations of the symptomatic procession producing the state of hypersensibility so well known to all those who have read or studied the writings of Theobald Smith.

A new guinea-pig having received, under the same conditions, the same quantity of Preisz-Nocard bacilli, did not show any trouble either immediately or later.

I then formed the idea of testing a *local hypersensibility* in a lot of guinea-pigs with which I had been experimenting, consisting of four subjects inoculated at the same time, in the same place and with the same dose of the virulent Preisz-Nocard bacilli, including that guinea-pig which had shown the increasing signs of infection described above, *plus* another guinea-pig which had received on the 30th of March an inoculation of living Preisz-Nocard bacilli in the foot and which no longer presented any signs of infection except the cicatrices left by the healed lesions.

On the 27th May those five animals, as well as five others taken as controls (a new guinea-pig, three guinea-pigs previously inoculated with a non-fatal dose of anthrax bacilli, and a guinea-pig previously inoculated with 100th of a milligramme of human tubercle bacilli) received into the thickness of the cutaneous skin on the external hip of the left side, previously divested of hair, between 1/10th and 1/20th c.c. of "Preisznocardine." From 24 to 36 hours later the five guinea-pigs infected by the Preisz-Nocard bacilli showed, at the place where the intradermal inoculation had been made, a manifest local reaction, evident by the appearance of a patch of pale green or dark claret colour, bordered in some cases by a dull edge of which the diameter varied between that of a large lentil and that of a 50-centimes piece, developed on an œdematous disc of skin of which the surface largely exceeded that occupied by the necrotic patch. In one of the guinea-pigs in which the skin was pigmented the epidermis had taken on its surface a copper colour and had here and there small hæmorrhagic points.

In about 48 hours the induration was still more marked, and the patch became covered by a dry, brownish-coloured crust which persisted for several days, while all around the skin became exfoliated.

In the control guinea-pigs there did not appear to be any alteration of the skin at the place of inoculation, except in the one which had been used for the tuberculosis experiment, which showed on the surface a small papule standing out about the size of a lentil, without any necrotic lesion, and without any changing of the coloration of the skin.

To sum up, it can be affirmed that the intradermal reaction to the "Preisznocardine" was marked in the guinea-pigs experimentally infected by the Preisz-Nocard bacilli for at least two weeks, perhaps earlier still by the allergic signs of the same type, but much more intense than those which usually mark the positive intradermal reaction to tuberculin in the guinea-pigs infected by old experimental tuberculosis.

From a theoretical point of view, the fact that the guinea-pigs infected from a certain time by the Preisz-Nocard bacilli were found in a state of hypersensibility with regard to the products of bacterial autolysis contained in the filtration liquid of old cultures of specific bacilli, does not show anything exceptional. On the contrary, it might perhaps have been more surprising.[1]

The knowledge of this phenomenon has not, then, any doctrinal interest, but I thought that it was useful to make this the object of a communication in view of the possible application of the process of the intradermal reaction to "Preisznocardine" as a practical diagnostic for caseous lymphadenitis in sheep.

At present all the countries which are intensively engaged in the exportation of mutton, *e.g.*, Argentina, Uruguay, Chili, Australia and New Zealand, are actively occupied, following the representations made by the English Government, in undertaking a struggle against this tenacious chronic disease which, completely neglected up to now, is very extensively affecting the flocks of those countries.

From a diagnostic point of view, it is not necessary to stress the importance offered by a diagnostic so simple as the intradermal reaction which, in less than 48 hours, permits us to separate the infected from the non-infected animals, which cannot be done by a clinical examination.

The experimental results shown in the guinea-pigs lead one to believe that as favourable results might be obtained in the naturally-acquired disease in sheep. Without that one cannot affirm anything definite.

An example is the divergencies noted in the history of Brucellosis concerning the manner it manifests itself in the different species of animals when tested by the intradermal method, preventing in this respect all sorts of generalisation. It is, then, experiments in infected sheep alone that will inform us as to what the results will be. The practice of this new procedure as a diagnostic agent can only be experimentally and usefully tested in the countries named above.

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[1] In a publication which appeared in the *Revue Generale Médicine Vétérinaire*, 15th May, 1919, under the title: "Contribution a l'etude de la lymphangite ulceruse (Travail due centre de recherches militaires de l'Ecole d'Alfort)," without the name of the author, it is shown that horses affected with ulcerous lymphangitis, a condition caused, as it is well known, by the Preisz-Nocard bacillus, furnishes a local reaction when one injects 1 c.c. of a glycerine extract of a pure culture of the Preisz-Nocard bacilli in the sub-palpebral conjunctive tissue. But, according to the article, this reaction could not be considered as truly specific, having regard to the fact that it produces a less marked but nevertheless œdematic change or reaction in healthy horses.

T. D. Y.

Veterinary Work in the French Sudan.

In the French Sudan last year the principal activity of the veterinary service was the improvement of local sheep by crossing with Cape merino rams. Two principal local varieties were tried, the Macina (woolled) sheep at El Walaji, and the Toronke (haired) breed at Nioro. The half-bred Macina flock, however, suffered severe losses, primarily through malnutrition during the dry season, but the others, although weakened considerably by internal parasites, gave from ·75 to ·83 of a kilogramme of wool, according to sex. Other breeding experiments were concerned with the improvement of goats by crossing with the Angora variety, and of cattle and pigs at the Sotuba station. Two new stations are being opened up at Nara and Gao for the distribution of the half-bred animals, and for other extension work, and the laboratory at Bamako supplied 32,340 doses of anti-rinderpest serum.—*West Africa.*

An interesting instance of the danger of arguing from animals to man in diet problems is contained in the reports upon the digestibility of foods published in the *Archives of International Medicine.* It was found that dogs were able to digest certain foods more quickly when bolted in lumps than when given minced or grated. It does seem certain, however, that human digestion is assisted by certain combinations of foods, these being dealt with more readily than the same foods eaten separately. This is contrary to advice given by the famous surgeon Abernethy, to take one dish at a time, *e.g.*, to avoid eating much starchy food with meat.—*Journ. Inst. Hyg.*

Municipal Report.

Annual Report (1929) of the Chief Veterinary Officer, Surrey.

The Annual Report of the Chief Veterinary Officer of the County of Surrey for the year 1929 shows that this county realises that a properly-trained staff of Veterinary Officers is essential for the adequate control of animal diseases and the safeguarding of the public health through the milk supply.

The veterinary staff of the County Council consists of a Chief Veterinary Officer with four whole-time assistant Veterinary Officers and seven part-time Veterinary Officers. The four whole-time Veterinary Officers are entirely engaged on work under the Milk and Dairies Orders and Tuberculosis Order of 1925 and all dairy herds in the county are inspected once a quarter. The duties of the part-time Veterinary Inspectors are those arising out of the Diseases of Animals Acts excepting those under the Tuberculosis Order. They are also available to assist in routine dairy inspection if necessary, and they inspect stock at certain weekly auction markets in the county.

This system ensures the proper harmony between the Milk and Daries and the Tuberculosis Orders, which is difficult to secure in any other way.

During the year under review there were very few outbreaks of scheduled disease other than tuberculosis. Nine cases of anthrax were reported, of which seven were confirmed, and four outbreaks of parasitic mange in horses were also dealt with. There were no cases of foot-and-mouth disease, glanders or sheep scab in the county. Of the 112 cases of swine fever reported, 68 were confirmed, but the Council's veterinary staff is not responsible for the administration of the Swine Fever Orders.

With regard to tuberculosis, the total number of bovine animals reported to the Police or Inspectors of the Local Authority as suspected cases was 75, of which 30 were diagnosed as not coming within the scope of the Order. The balance of 45 animals, together with 89 cases detected on the occasion of the routine inspections of dairy herds, a total of 134 animals (comprising 108 cows in milk, 25 other cows or heifers, and one bull), were diagnosed by the veterinary staff to be suffering from tuberculosis. These are classified below according to the forms of disease with which the animals were found to be affected.

Milk	17
Udder	32
Emaciation	35
Chronic cough, etc.	50
Total	134

The quarterly routine inspections during the year called for 4,577 visits and the examination of 69,510 animals, in addition to many special examination of herds under Sections 4 and 5 of the Milk and Daries (Consolidation) Act, 1915.

During the year 1,176 samples of milk were taken by the veterinary staff for examination, of which 4·5 per cent. proved to be tuberculous.

E. C. L.

In Parliament.

The following questions and answers were recorded in the House of Commons recently:—

Head Lamps for Pit Ponies.

Mr. Freeman asked the Home Secretary for Mines whether he has any information concerning the provision of a head-lamp for pit ponies in mines with a view to minimising accidents and injury; and, if so, whether he is taking any steps to secure its adoption?

Mr. Shinwell: I have authorised the use of a modified form of an approved electric cap lamp for experimental trials underground for this purpose at a mine in Yorkshire, and the progress of these trials will be watched with interest by my Department. Some provisional experiments have also been made in South Wales by one of His Majesty's Inspectors of Horses, using an ordinary cap lamp. At present, there is not enough evidence to enable any definite judgment to be arrived at as to the value of lamps used for such a purpose; but so far as they have gone, the experiments are encouraging. My Department will continue to watch them closely and will encourage any further experiments in the same direction.

Grass Sickness.

Mr. Boothby asked the Secretary of State for Scotland whether he can give any further information regarding the causes of grass sickness; and whether he will add it to the scheduled list of diseases of animals?

Mr. W. Adamson: I regret that I can give the hon. Member no further information on the subject of this disease than is contained in my replies to previous questions. The investigations which are being conducted by the Animal Diseases Research Association have not so far elicited any conclusive evidence as to the cause of the disease. In the view of the association, this disease is a very baffling problem, and only through intensive and prolonged investigation is a solution likely to be obtained. The question of scheduling the disease under the Diseases of Animal Acts is a matter for my right hon. Friend the Minister of Agriculture and Fisheries.

Poison Gas Experiments.

Mr. Freeman asked the Secretary of State for War whether any poison gas experiments have been made on volunteers or compulsorily other than for the treatment of skin burns or for the protection afforded by respirators; and, if not, what method is pursued for testing and proving the efficiency of poison gas or its antidote?

Mr. Shaw: No persons undergo tests compulsorily. The tests on volunteers are solely of the nature of those referred to in the first part of the question. As regards the last part of the question, as my hon. Friend is aware, experiments in connection with protection against gas are made on animals, and as I have already pointed out to him there is no reason to believe that the results of those experiments will not be applicable to the protection and treatment of human beings.

Osprey (Destruction).

Mr. Mathers asked the Lord Advocate if his attention has been called to the recent destruction of an osprey at Grantown-on-Spey, notwithstanding that the osprey is protected under the Bird Protection Order for the county of Moray; and whether any steps are being taken to prosecute the offender so that the osprey, now extinct in Scotland, may be assured of protection and have an opportunity of being re-established?

The Lord Advocate: On September 26th last an osprey was found on the roadside in a wounded condition and was killed by a carter with a stone. On examination it was found that it had been suffering from a broken wing and that the wound was gangrenous. Assuming that there was a breach of the law—which is far from clear—the case was obviously one which did not call for criminal prosecution.

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Oats (Supply).

Mr. Ross asked the Secretary of State for War what proportion of oats supplied to Army horses in the United Kingdom were of home, Dominion, and foreign origin?

Mr. Shaw: Except for one summer training camp, for which 18 tons of Dominion oats were purchased, all orders (about 20,000 tons) for the 12 months up to October 31st last were for home-grown oats. It afterwards came to light that in the case of two small deliveries (about five tons in all) foreign or Dominion oats had been irregularly supplied in place of home-grown oats. In addition, some 575 tons of Dominion oats were issued from reserve stock bought in previous years.

Milk Supply, School Children.

Mr. James C. Welsh asked the Secretary of State for Scotland whether he is yet in a position to say what the results have been regarding the tests made in supplying milk to school children in Lanarkshire?

Mr. W. Adamson: The results, I am glad to say, are satisfactory, and will be published by the Department of Health for Scotland. It is hoped to make the report of the investigation available at an early date.

Vivisection.

Mr Freeman asked the Home Secretary how many licences for the performance of experiments on living animals have been refused, if any, during last year?

Mr. Short: Four applications for licences were refused during 1929.

Mr. Freeman: Can the hon. Gentleman give the reasons for these refusals?

Mr. Short: Perhaps the hon. Gentleman will put down another question.

Mr. Kirkwood: Was the right hon. Gentleman the Member for West Woolwich (Sir K. Wood) among the refusals?

Stray Dogs (Accommodation, Police Stations).

Sir R. Gower asked the Home Secretary when the last inspection was made by an officer of his Department of the accommodation for stray dogs at police stations in the Metropolitan area; and whether he proposes to take any steps with a view to that accommodation being improved, and particularly so that provision can be made for keeping female dogs in separate kennels pending their removal to a dog's home?

Mr. Clynes: The accommodation for this purpose is under inspection by officers of the Commissioner of Police and not directly by my Department. Measures are under consideration for the improvement of the accommodation generally, and the particular matter referred to will not be lost sight of.

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Bill Presented.

Protection of Animals (No. 2) Bill.

"To prohibit the hunting of deer," presented by Mr. Lovatt-Fraser; supported by Mr. Freeman, Sir Robert Gower, Lieut.-Colonel Moore, Mr. Evans, Mr. Foot, Mr. Cocks, and Sir Ernest Bennett; read a Second time on Wednesday, and to be printed. [Bill 60.]

Psittacosis.

Ministry of Health Report.

The Ministry of Health has issued a report on "A Disease of Parrots Communicable to Man (Psittacosis)" by Drs. E. L. Sturdee and W. M. Scott. These investigators found that most of the cases of psittacosis which occurred in this country and abroad were associated with Brazilian parrots, but African grey parrots have been the agents in some instances, while in three cases budgerigars (love-birds), and in one case a canary, had been involved. In the Argentine infection had occurred from thrushes; in the same country one case had been traced to an Italian Cardinal bird; two cases associated with canaries had been reported from the United States.

Persons in the bird trade enjoy an apparent immunity, but this may be due to the possession of an immunity acquired as the result of an early attack of the disease. Young children are less susceptible than adults.

The conclusion is stated that the ætiological agent of psittacosis in parrots is a virus which cannot be cultivated on ordinary media, and which is capable of passing through some of the more porous filters. The presence of a filterable virus in human beings suffering from psittacosis has been demonstrated, and it has been possible to transmit the disease to susceptible animals. Among these must be classed parrots, budgerigars (less than parrots), hens (less than budgerigars). Attempts to infect pigeons, greenfinches, and linnets failed. Mice could be infected; guinea-pigs could not be.

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Psittacosis in Denmark.

"C. H. Würtzen (*Ugeskrift for Laeger*, September 25th, 1930, p. 907) gives an account of how psittacosis came to Denmark, and of the investigation made into its etiology," says the *British Medical Journal*. "On February 1st, 1930, the steamship "Louisiana" came into the port of Copenhagen with a crew of 34 men, not including the officers. She had left Bahia on January 6th; in this port the crew had bought thirty Brazilian parrots. Some of them looked poorly at the time of purchase, and several died during the voyage. Most of the survivors were sold in Madeira, and of the five parrots which reached Copenhagen alive two were ill. Nine days after the ship left Bahia one of the crew became ill, and was admitted to hospital in Madeira, where he subsequently recovered. Several new cases occurred during the last eight days of the voyage, and six of the crew were admitted to the fever wing of the Oresunds Hospital. At the State Serum Institute repeated examinations were made of the blood, urine, and fæces of all these patients. They were examined for the bacilli of typhoid fever, paratyphoid A and B, Bang, Breslau, Nocard, Gaertner, suipestifer, paradysentery Flexner D, Flexner H. Sonne, and Shiga. The results were almost completely negative; little importance was attached to the rare positive findings. After giving detailed accounts of the clinical course of these cases, none of which terminated fatally, Würtzen points out that the uniformity of the symptoms indicated a common causative agent. The most prominent feature was pneumonia, which, as has already been pointed out in connection with psittacosis, was characterised by absence of cough, expectoration, and pain in the chest, and the occurrence of only slight dyspnœa, though there was comparatively severe cyanosis. Considering what frequent facilities there must have been for exposure to infection during the voyage, it is noteworthy that out of a crew numbering altogether about 40 only nine should have contracted the disease, including two in whom it broke out after the ship had left Denmark."

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The *Bacillus psittacosis* (*Nocard*) was not found in experimentally infected parrots and parrakeets, in material obtained from human cases, or in infected birds and carcasses shipped to the National Health Institute in the 1929-30 outbreak of psittacosis in the United States.

Two experiments carried out at the Institute indicate that the causative agent of psittacosis in birds is a filterable virus. Equal numbers of birds were inoculated with a filtered and an unfiltered emulsion from non-infective material. The disease was conveyed as readily by the filtrate as by the unfiltered emulsion. Certain of the affected birds were given serum from a recovered case (human) and an equal number given a normal human serum. There was no curative effect observable from the use of the serum. The conclusion seems justified that Nocard's bacillus is not the causative factor in psittacosis of either parrots or humans.—*Veterinary Medicine.*

Dillon Testimonial Fund.

	£	s.	d.
Amount previously acknowledged	32	7	6
Infirmary and Office Staff of the Royal Veterinary College	1	8	0
Bullen, R. E. C.	1	1	0
Byerley, M. G.	1	1	0
Minett, F. C.	1	1	0
Perrin, C. W.	1	1	0
Pillers, A. W. N.	1	1	0
Buxton, J. B.	1	0	0
Perry, E. M.	1	0	0
Cabot, D. A. E.	0	10	6
Evans, W. G.	0	10	6
Gillmor, D. A.	0	10	6
Payne, A.	0	10	6
Scott, E.	0	10	6
West, E. Alfred	0	10	6
Adamson, J. senr.	0	10	0
Baxter, J. R.	0	10	0
Bywater, H. E.	0	10	0
Ede, H. J.	0	10	0
Hewer, J. R.	0	10	0
James, A. J.	0	10	0
Moore, Sir John	0	10	0
Parkin, H. J.	0	10	0
Purchase, H. S.	0	10	0
Sadler, M.	0	10	0
Stow, R. J.	0	10	0
Walker, G.	0	10	0
Ware, F.	0	10	0
Collet, H. B.	0	5	0
Davies, J. J.	0	5	0
Dunkin, G. W.	0	5	0
Edwards, E. R.	0	5	0
Jones, H. D.	0	5	0
Mills, G. H.	0	5	0
Parsons, C. C.	0	5	0
Perryman, W.	0	5	0
Simpson, P. J.	0	5	0
Taylor, F. J.	0	5	0
Willett, F. W.	0	5	0
Adams, S. H.	0	2	6
Crosfield, P.	0	2	6
Livesey, G. H.	0	2	6
Willett, J.	0	2	6
Total	£54	8	6

Subscriptions to be sent to :—
The Secretary,
Dillon Testimonial Fund,
Royal Veterinary College,
Camden Town, N.W.1.

R.C.V.S. Obituary.

Magnier, Cornelius Francis, Veterinary Department, Khartoum, Sudan. Graduated Dublin, July 20th, 1928; died November 22nd, 1930, aged 31 years.

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Woods, Captain Stanley H. L., Victoria Mews, Second Avenue, Hove, Sussex. Graduated London, December 18th, 1912; died December 1st, 1930, aged 47 years.

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Death of Mr. Robert Ewing Johnston.

We greatly regret to have to record the death, following an injury received in the hunting field with the East Antrim Hounds, on Tuesday of last week, of Mr. Robert Ewing Johnston, M.R.C.V.S., D.V.S.M., of 50, Gloucester Street, Belfast.

The meet was at Straid, near Ballynure, Co. Antrim, and the hunt had not been long in progress when the accident occurred. Crossing from a field on to the county road Mr. Johnston's horse failed to clear the fence properly, and the rider was thrown, the horse rolling on top of him. Several members of the hunt came to the assistance of the injured man, and be was brought to his home in Belfast. It was ultimately decided to remove him to a nursing home for an operation.

Robert Ewing Johnston was possessed of a very engaging personality, and was amongst the most popular of the younger members of the profession. A large number of our readers will remember the vivacious ability with which he conducted the dance orchestra which he was good enough to bring over to enliven the social side of the Ayr Congress, N.V.M.A. Educated at Sedburgh and Edinburgh University, Mr. R. Ewing Johnston, who graduated at Edinburgh in July, 1925, took his post-graduate degree of D.V.S.M. two years later. A keen sportsman, he was a frequent competitor at point-to-point meetings, and he was also an enthusiastic playing member of North of Ireland Rugby and Cricket Clubs. He was unmarried.

The son of Mr. J. Ewing Johnston, M.B.E., J.P., M.R.C.V.S., of Belfast, he had been engaged in assisting his father. He was a member of the North of Ireland V.M.A. Mr. R. Ewing Johnston's death at the early age of twenty-eight years will be universally deplored, and deep sympathy with the bereaved parents will be widespread on both sides of the Irish Sea. The interment took place at Dundonald Cemetery, Belfast, on December 5th, when, says the *Belfast Post*, the cortege was one of the largest seen in the city, including representatives of most of the leading business concerns, and the majority of the members of East Antrim Hunt. Amongst the immense number of wreaths were many from professional colleagues.

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The Late Captain S. H. L. Woods.

Captain Stanley H. L. Woods, M.R.C.V.S., of Victoria Mews, Second Avenue, Hove, whose death was announced in our last issue, was taken suddenly ill in a train at Victoria on Monday of last week and died almost immediately.

Captain Woods, who was 47 years of age, had been practising in Hove since May last. He was a veterinary surgeon at Eastbourne for several years and was widely known in Sussex.

About a year ago he sold his interest in the firm of Messrs. Golding and Taylor, and left Eastbourne. Captain Woods had spent some years in the East, were he was in the service of the King of Siam and became an expert on elephants.

In Eastbourne he specialised in the treatment of dogs. He was a regular attendant at social functions and did work in connection with an Eastbourne East End club for boys.

Notes and News.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Dec. 15th.—Meeting of the Editorial Committee, N.V.M.A., at 2 Verulam Buildings, Grays Inn, W.C.1, 4.30 p.m.

Dec. 17th.—Meeting of the West of Scotland Division, N.V.M.A., at Glasgow.

Jan. 8th, 1931.—Dramatic Entertainment, organised by Lieut.-Col. P. J. Simpson, in aid of the Victoria Veterinary Benevolent Fund, at the Rudolf Steiner Hall, Park Road, London, N.W.1.

Personal.

Professor James Macqueen.

In our last issue we had, to our great regret, to inform our readers that the recovery of Professor James Macqueen,

President of the N.V.M.A., had been less rapid than had been hoped, and that he had been removed to the Hampstead General Hospital. All will be relieved to learn that the improvement of which we spoke as having taken place since Professor Macqueen's admission to the Hospital, has been well maintained, and that his general health now gives rise to less anxiety. It is doubtful, however, whether the President will leave hospital in time to spend Christmas at home.

Dr. Griffith Evans Honoured.—On behalf of all his colleagues in the Veterinary Profession we offer our heartiest congratulations to Dr. Griffith Evans, of Bangor, on the decision of the Bangor City Council to confer upon its distinguished veterinary-scientist resident the Freedom of the Borough. Dr. Griffith Evans is 96 years old.

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Appointments.—The following are among the appointments made by the Secretary of State for the Colonies during the month of November, 1930:—Mr. R. A. Hammond, M.R.C.V.S., as Veterinary Officer, Kenya Colony and Protectorate; Mr. P. L. le Roux, M.R.C.V.S., as Assistant Veterinary Research Officer, Northern Rhodesia.

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Will.—Berry, Mr. Arthur Holman, F.R.C.V.S. (58), of Bayard Lodge, Parkstone Road, Poole, Dorset, and formerly of Hepston Road, Streatham, London, S.W., Chief Veterinary Inspector, Board of Agriculture (net personalty, £3,599), £3,643.

Motor Insurance: Road Traffic Act, 1930.

Members are reminded that Part II of the Road Traffic Act, 1930, which comes into force on January 1st, 1931, provides that a policy of insurance shall be of no effect for the purposes of that part of the Act, without a Certificate of Insurance, which must be produced to the Authorities when required. Members would be well advised to make enquiries from their Insurance Companies or Agents as to other points regarding motor insurance which may require their attention in consequence of the operation of the Act.

The Methylated Spirits Regulations, 1930.

In the course of a notice, relative to the above, issued by the Commissioners of Customs and Excise, it is stated that, amongst others, any veterinary surgeon may, on application to the nearest officer of Customs and Excise, obtain authority to receive industrial methylated spirits, which, consisting of 95 parts of ethyl alcohol denatured with five parts of wood naphtha, may be obtained in various strengths, including a strength corresponding to that of absolute alcohol. Industrial methylated spirits received under such an authority may be obtained either from a methylator (in quantities of not less than five gallons at one time) or from any wholesale chemist or dispensing chemist authorised to sell them (in quantities not exceeding four gallons at one time). On each occasion a "requisition" (in an official form, a book of which will be supplied by the Officer of Customs and Excise) must be forwarded to the supplier. Without obtaining any authority, any veterinary surgeon, etc., may obtain industrial methylated spirits in quantities not exceeding half a gallon at one time, merely on a written order signed by a medical practitioner, dentist or veterinary surgeon.

Industrial methylated spirits may be used in making up articles to be dispensed for veterinary purposes, or used or dispensed, without admixture, or diluted with water, for any veterinary purpose, but may not be used or disposed of by a veterinary surgeon (etc.) for any other purpose.

To every bottle or other container dispensed to a patient and containing either an article made with industrial methylated spirits, or industrial methylated spirits, must be affixed a label bearing the words "For External Use Only," "Not to be Taken," or otherwise to the same effect. No greater quantity than one pint of industrial methylated spirits, either above or as an ingredient in any article, may be dispensed at one time to or for the use of any one person.

The Royal Veterinary College.

In the course of a letter published in a recent issue of the *News Chronicle*, Mrs. George Cadbury, of Birmingham, writes as follows:—

"I was surprised to see in the *News Chronicle* yesterday that there had been such a poor response to the appeal for the money required to rebuild and maintain the Royal Veterinary College. It is amazing to think that Germany does so much better than England in this direction. She has four Veterinary Colleges, and Leipsig has just raised a million for another fully-equipped one. The British are generally considered to be animal lovers, but it would seem as though their love was mainly confined to sport.

"I should be glad to send a contribution through you of £100, if nine other *News Chronicle* readers will send a further £100 each. It is a very small amount compared with what is needed, but perhaps several efforts in this way might help to raise the necessary funds."

Mysterious Cattle Malady.

Three veterinary experts, including the chief veterinary inspector for the North Riding and an inspector from the Ministry of Agriculture, have been unable to identify a mysterious malady which has killed 10 cattle on a farm at Grosmont, Yorkshire, during the past few days. One suggestion made was that the deaths might be due to a germ floating in the air. Against this, however, is the fact that neighbouring farms are immune. Neither the veterinary surgeon attending the cattle nor the veterinary inspector has previously met with a similar outbreak. They have definitely concluded that the symptoms are not those of any of the notifiable diseases.—*The Times.*

Glasgow College Prize Distribution.

One gold and eleven silver medals, in addition to various diplomas, were awarded to successful students at the annual prize distribution of the Glasgow Veterinary College.

Professor John Glaister, who presided, said they had been told that the Glasgow College was a parochial institution. To show the cosmopolitan character of the roll of alumni, he quoted 13 Scottish counties from which students were drawn.

"Then we go abroad to the North of Ireland—(laughter)—we make a foray into England, and we have representatives from Palestine and India," added the professor.

If they submitted the Glasgow college to three tests—the maintenance of a steady supply of students, the number of honours and passes at the R.C.V.S. examinations, and the efficiency of the teaching—he considered that they would not find a better college for veterinary teaching either in Scotland or abroad.

Referring to the withdrawal of the Government grant five years ago, Professor Glaister said this was a very bad time to appeal for money, but if the college continued as they had been doing they would weather any storm, and some day the Government might "ta' a thocht and mend" and give them support again.

The prizes were distributed to the students by Lord Provost Kelly.—*Glasgow News.*

Shire Horse Society.

A Protest.

The Council of the Shire Horse Society met on Wednesday, and approved the schedule for the show on February 24th, 25th and 26th next, comprising 23 classes

with prizes totalling £1,900. The four sections, stallions, mares, geldings, and commercial, were adequately catered for, and Sir Gomer Berry had presented a 100 guinea challenge cup for the best stallion in the show. A further cup, value £25, presented by Mr. David Davies, is to be awarded to the champion stallion. The following resolution was passed concerning reports that orders had been made restricting horse traffic:—"That this society protests most strongly against the seemingly incorrect statements which have appeared in a part of the Press, as any suggestion to exclude horses from London streets can but have a serious effect on small traders, as well as the horse breeding industry and all those trades associated with it."

A medical committee of the League of Nations has worked out estimates of the total world supplies of drugs that are required for legitimate medical and scientific purposes, and a plan is being discussed whereby the manufacturing countries are to limit their supplies accordingly. Statistics prepared by the committee show the annual needs of the world as 84½ tons of drugs, *i.e.*, 56 tons of medical opium, 10·4 tons each of morphine and codein, 6·8 tons of cocaine, and 0·87 tons of heroin.

A remarkable ram, possessing one pair of sheep's horns and one pair of goat's horns was taken to the slaughter-house in Cracow, reports Reuter's correspondent there. These phenomena saved the animal's life, and this unusual specimen was despatched to the Zoological Gardens in Warsaw.

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

An Act of Parliament which the Profession Neglects.

To the Editor of The Veterinary Record.

Sir,—In these days of increasing mechanisation of transport, keener competition by the various professions as to what is their prerogative, and a seeming desire on the part of some professions to seize any prerogative which happens to be lying handy, it strikes me as an extraordinary display of lethargy, on the part of our profession, that when a piece of legislation dealing with, and solely concerning, the animal kingdom, is put on the Statute Book, the profession ignores it to such an extent that, I venture to say, the veterinary surgeons holding office under the Act in this country can be counted on the fingers of one hand.

I refer to the Performing Animals Act, which was passed in 1925, the terms of which are simple in the extreme, and can be (indeed should be) carried out by the veterinary surgeon.

The provisions are, briefly:—

(*a*) The registration of licensees and the issuing of certificates.

(*b*) The inspection of all animals being trained or exhibited, before and during the training or exhibition.

(*c*) The inspection of licences issued under the Act.

When the Act came into force, the City of Hull appointed its two Veterinary Officers (and for some weird reason, its Medical Officer) as officers under the Act, and since that date (December, 1925) all performing animals visiting Hull have been methodically inspected by those officers, and, where necessary, licences have been issued. I have myself dealt with some fifty different licences, and by constant questioning and from unsought observations on the part of many of these showmen as to the functioning of the Act, up and down the country, I have come to the very definite conclusion that the Act has misfired in the following manner:—

The Home Office has issued it chiefly to the Police Departments (through the various Watch Committees, one presumes) and as in other small Acts no officers have been appointed by those bodies in most cases, the result is that licensees can, and do, travel about the country for months at a time and never see a bona-fide officer under the Act.

Here, then, a chance is offered to the National to assure its members of one more prerogative. A suggestion from the National to all local authorities that they should appoint their veterinary inspectors as officers under the Act, would, I think, increase the utility of the full-time veterinary inspector, and possibly the emoluments of the part-time man; and, finally, anything which tends to increase the scope of the veterinarian should be assiduously sought after.

Yours faithfully,

P. Dennis Dunn, M.R.C.V.S., F.Z.S.
Deputy Chief Food Inspector, Hull.

Tuberculin Testing.

To the Editor of The Veterinary Record.

Sir,—I am obliged to Mr. R. E. Glover for his further contribution, under the above heading, published in your issue of December 6th. It was by no means my intention to take him to task for advising against the use of the subpalpebral test; my sole desire was to prevent practitioners who may have read the report performing it in an incorrect manner, and so exposing the method to the risk of unmerited failure.

I gladly accept Mr. Glover's assertion that he is fully aware that the subpalpebral method is essentially subcutaneous, but after again perusing his former statement I feel that any misunderstanding on my part was almost pardonable.

I deeply regret that I have added to Mr. Glover's regret—and surprise—by continuing to swell the ranks of those benighted individuals who continue to face an occasional difficulty in interpreting the results of the intradermal test. The reason lies not in lack of experience nor in failure carefully to digest and follow the teachings of current literature, but rather in a lack of confidence, both in those embarrassing moments when one searched feverishly for lesions that were not or demonstrated those that should not have been. It would be helpful if one could accept Mr. Glover's advice and condemn every "doubtful" reactor, presuming for the moment that such cases exist, were it not that, in the light of the before-mentioned recollections, such a procedure might impose too severe a strain upon an already overburdened conscience. I am perfectly in agreement that concentrated glycerine broth should be used as a control in every case, but, although so far it has not been my experience, I gather from some of my colleagues that in rare cases the swelling resulting from this injection has resembled in every particular a typical tuberculin reaction. Such an instance might produce, in conjunction with the intradermal test, a bona-fide "doubtful" reactor.

I quite fail to realise that the failure of the subcutaneous test, a thermal one, has any bearing upon the efficacy of the subpalpebral, which is essentially local as regards interpretation. The loose, abundant connective tissue beneath the base of the lower eyelid does not appear so sensitive to these "accidental" disturbances as the skin, but it appears markedly more sensitive in tuberculous subjects to the presence of tuberculin. If the very large swellings in this region which so frequently follow the application of the test were merely the result of a minute quantity of tuberculin reaching the skin during the insertion or withdrawal of the needle, then the same reasoning would apply to the intradermal test and it would be of no consequence

if the injection were made intradermally or subcutaneously. Mr. Glover has frequently and rightly emphasised the care one must take to ensure that the injection should enter wholly into the skin substance. Januschke certainly did conclude, as a result of his researches, that thermal reactions might occur without local swelling in the subpalpebral region, but in the light of further experience such instances must be rare. Judging from the fact that a greater percentage of animals fail to pass the subpalpebral test, it would seem that the intrapalpebral method may more frequently fail from the same cause; a marked rise of temperature with a general air of malaise is quite a common accompaniment of a reaction to either and should be noted with suspicion in every non-reactor.

In conclusion, I quote three instances of so-called doubtful reactions occurring in a herd of forty Guernsey cows tested to-day and being disposed of to fill gaps in Grade A T.T. herds in various parts of the country.

I.—Initial measurement, 4 mm.; 2nd measurement, 7 mm.; final measurement, 15 mm. The swelling was hard to the touch, quite free from œdema and quite painless. The attendant remarked that the animal appeared ill. Subpalpebral reaction very marked, eye closed and painful.

II.—Initial measurement, 3 mm.; 2nd measurement, 4 mm.; final measurement, 4 mm. No change could be felt in the skin. On palpation marked hyperæsthesia was evident; on pinching the site of injection, the cow flinched and tried to lie. Subpalpebral test—negative.

III.—Initial measurement, 5 mm.; 2nd measurement, 7 mm.; final measurement, 7 mm. A circumscribed, hard, pea-like swelling only very slightly painful on hard pressure. Subpalpebral test—markedly positive.

After glancing at the footnote of each case, the diagnosis will appear simple. That is why I favour the subpalpebral method.

Yours faithfully,
R. H. Smythe.

Camborne.
December 6th, 1930.

The Economics of Hunting.

To the Editor of the Veterinary Record.

Sir,—*Re* your extract from the *Daily Express* in this week's issue:—"Every penny that is spent on fox-hunting goes back into British pockets"—so does every penny you transfer from your left trouser pocket to your right. "Hunting is a greater national asset from the employment point of view than any other sport." A national *asset* from the employment point of view, certainly, but obviously a national *deficit* from the productive point of view.

The Hunting Correspondent will have to hunt a little more logically if he wishes to be in at the death with regard to increasing national wealth. Expenditure is one thing and production is another and "never the twain shall meet."

J. M. Armfield.

Garth Steading,
Chipstead,
Surrey.
December 6th, 1930.

The Editor acknowledges the receipt of the following:—

Report of a meeting of the West of Scotland Division, N.V.M.A., from Mr. Donald Campbell, Hon. Secretary.

Report of a meeting of the Midland Counties Division, N.V.M.A., from Mr. H. J. Dawes, Hon. Secretary.

Communications from Mr. James Anderson (Edinburgh), Dr. O. Charnock Bradley (Edinburgh), Mr. K. D. Downham (Liverpool), Major F. J. Dunning (Cape Province), Mr. W. C. Miller (Edinburgh), and Dr. F. C. Minett (London).

Diseases of Animals Acts, 1894 to 1927.

SUMMARY OF RETURNS.

Period.	Anthrax.		Foot-and-Mouth Disease.		Glanders (including Farcy).§†		Parasitic Mange.§		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks confirmed.	Animals attacked.	Outbreaks reported by the Local Authorities.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 16 to 30 Nov., 1930	19	22			—	—	2	2	26	95	743
Corresponding period in—											
1929 ...	15	18	1	60	—	—	4	8	60	198	113
1928 ...	18	20	2	172	—	—	9	60	65	50	25
1927 ...	23	25	25	1,614	—	—	7	9	73	101	34
Total 1 Jan. to 30 Nov., 1930	338	380	8	305	—	—	186	278	385	2,240	988
Corresponding period in—											
1929 ...	405	494	36	3,448	—	—	189	371	511	2,644	1,543
1928 ...	489	566	133	11,109	1	1	251	516	539	1,380	697
1927 ...	390	461	73	5,854	—	—	317	513	608	1,622	759

Note.—The figures for the current year are approximate only.

† Including outbreaks in recently imported animals. § Excluding outbreaks in Army Horse

The
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NOTICES.

Intending advertisers are requested to note that, in consequence of the Christmas Holidays, Tuesday, December 23rd, will be the latest date upon which advertisements can be accepted for publication in the issue of December 27th.

Royal College of Veterinary Surgeons.

Frank Garnett Annuity.

THE Council will proceed at its next Quarterly Meeting to nominate a member of the profession to receive the Frank Garnett Annuity, value £25. The Annuity is intended to assist an aged member in straitened circumstances in recognition of his services to the profession. Recommendations of suitable persons for the Annuity should be sent before 31st December, 1930, to the Secretary of the Victoria Veterinary Benevolent Fund, in order that they may be considered in the first instance by the Council of that Fund.

Central Veterinary Society.

THE next meeting of the Central Division, N.V.M.A. will be held at 10 Red Lion Square, W.C.1, on **Friday, January 2nd**, 1931, with the President, Captain G. Dunlop Martin, M.R.C.V.S., in the Chair.

AGENDA.

1. Routine.
2. "Torsion of the Bowel in Horses," by Major R. F. Wall, T.D., M.R.C.V.S.

J. F. MACDONALD, *Hon. Secretary.*

Professional Advertisements

These will be received up to Wednesday morning. Five lines or under 3/6; or two insertions 5/-; for three, 6/6. Each line above five—first insertion, 8d.; after first, 4d. Average—seven words in a line.

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WANTED, LOCUM.—Country Practice, Midlands, for about a fortnight, end December or beginning January; recent graduate, if experienced with cattle. References; state salary (live in). Drive own car or motor cycle preferred, or experienced driver.—Box 324.

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All communications relative to the business side of the "Veterinary Record" must be addressed to the General Secretary, N.V.M.A.; those relative to copy for advertisements, also literary matter, to the Editorial Representative, "Veterinary Record," 2, Verulam Buildings, Gray's Inn, London, W.C.1.

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